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MODERN METALS

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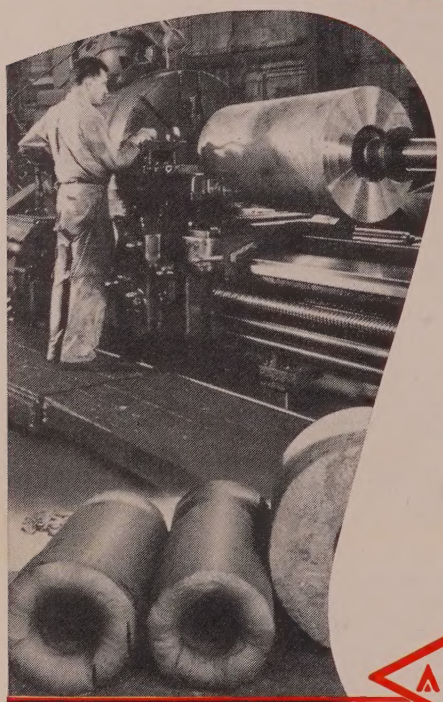
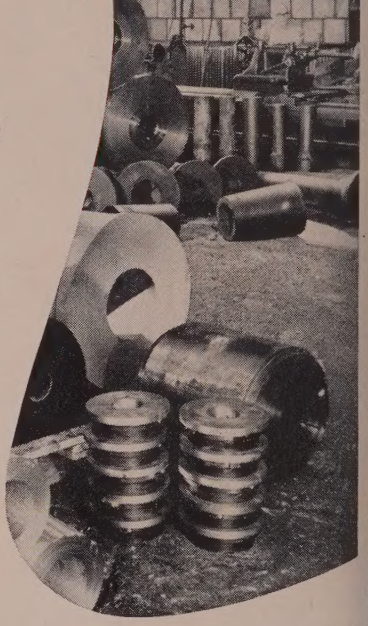
ACRE-SIZED ALUMINUM 'TENT' WINS REYNOLDS ARCHITECTURAL AWARD

SEE PAGE 66

AJAX

First Name in Extrusion Tools





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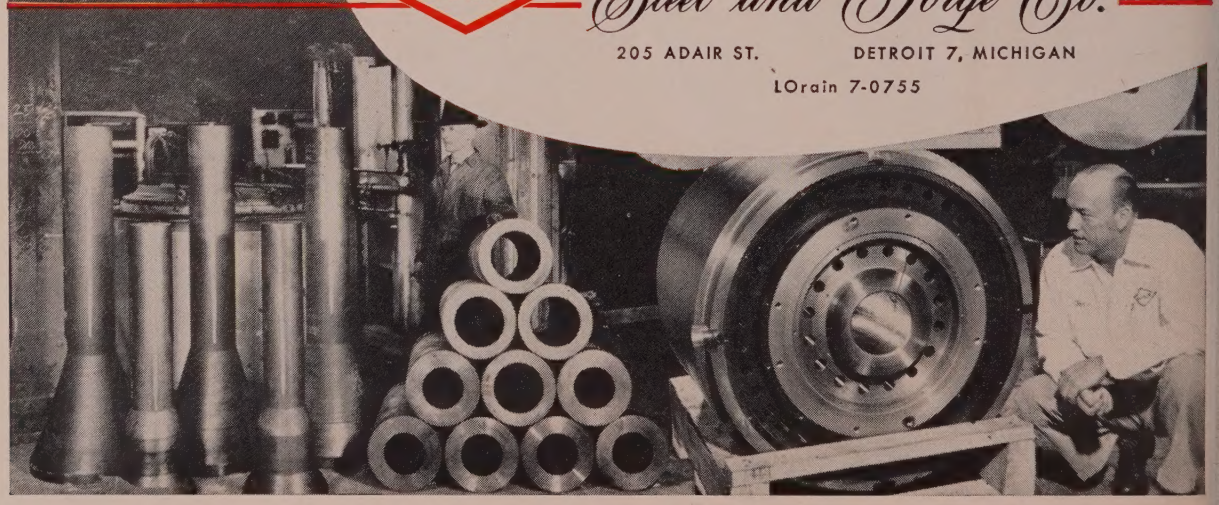

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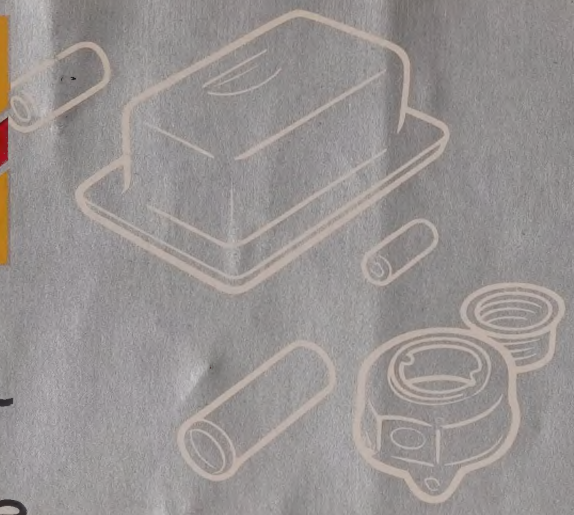

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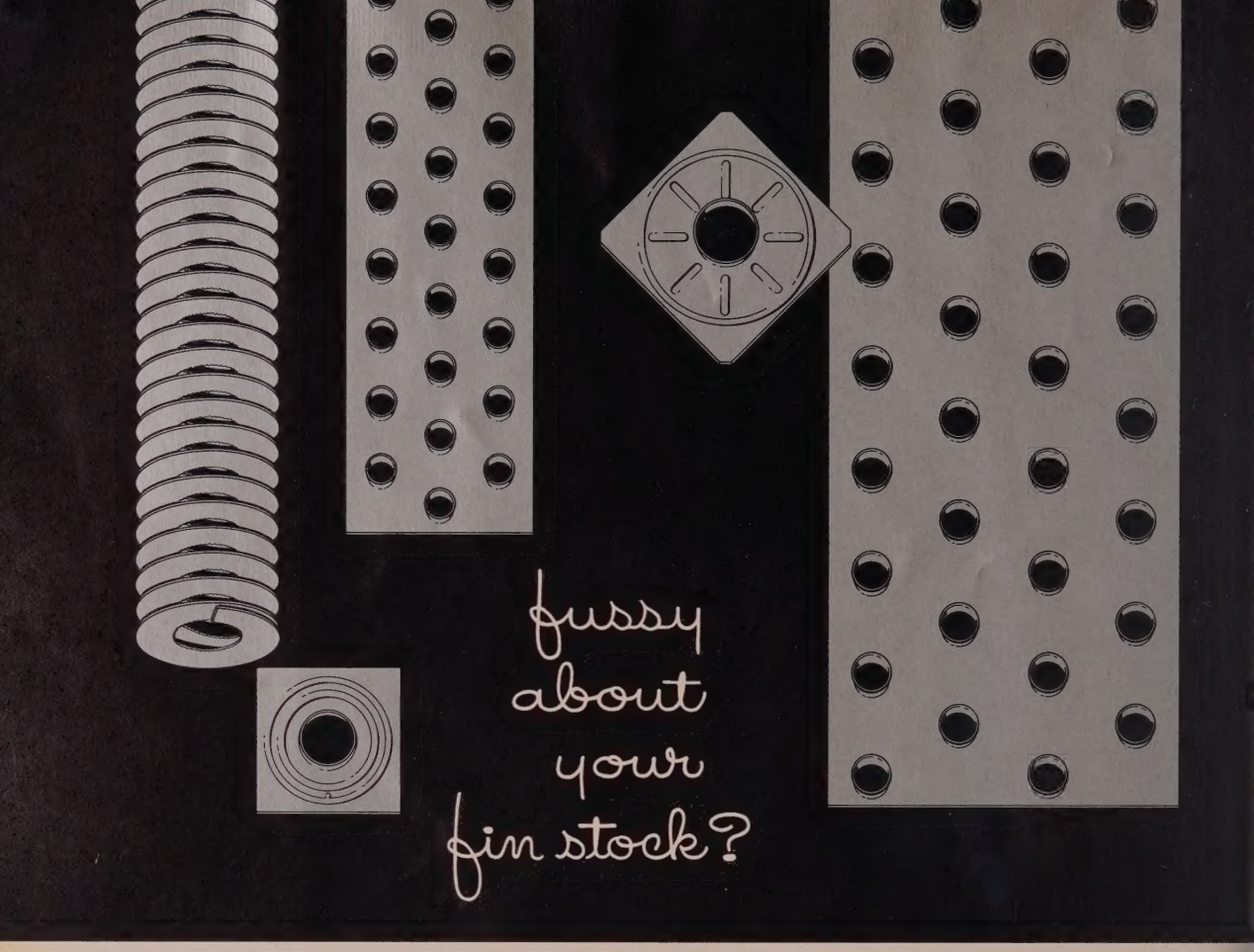

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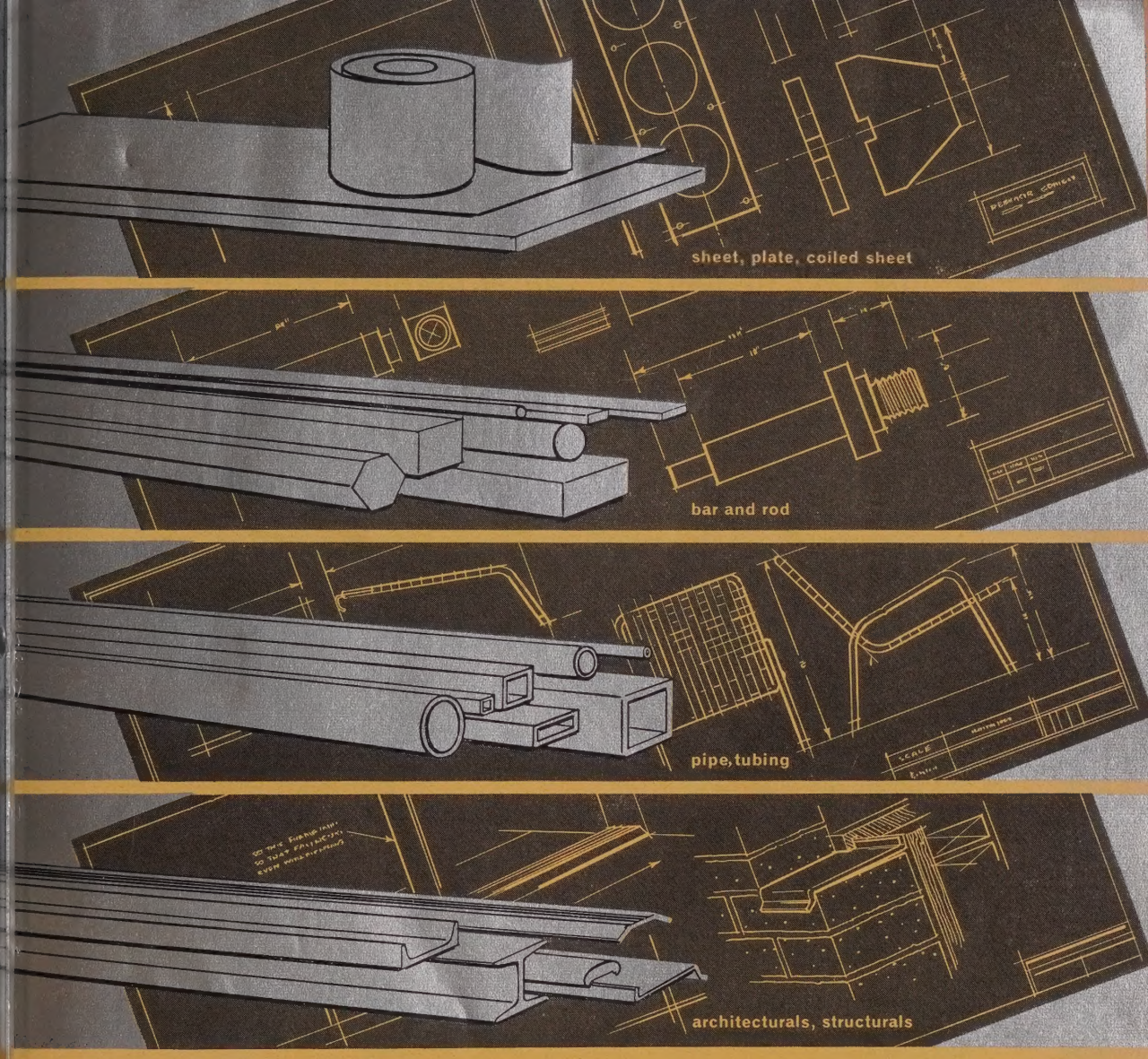

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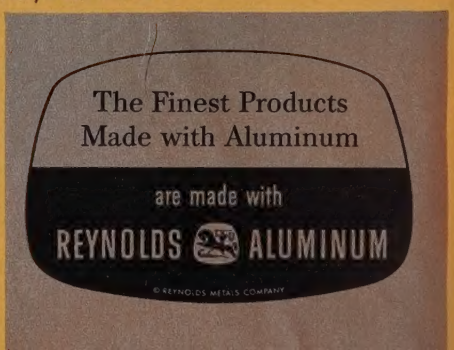

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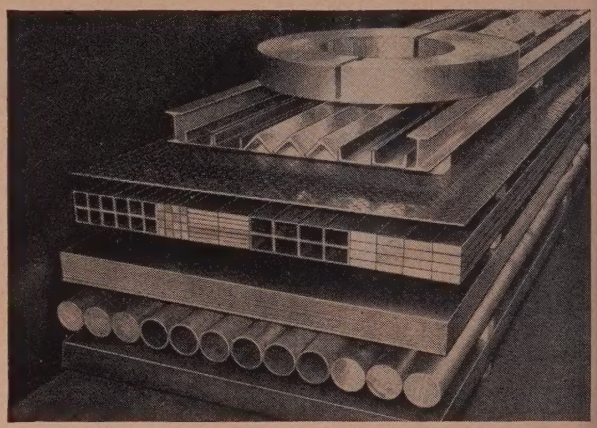

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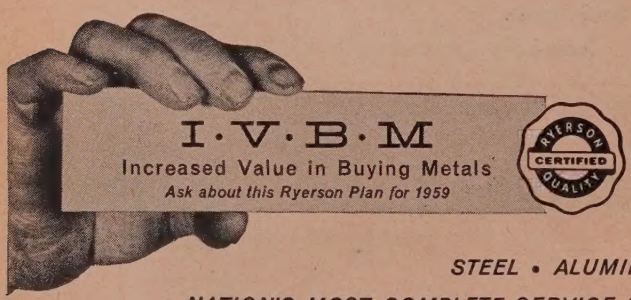

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Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

IN THE COVER: One of the most remarkable roof structures ever erected is the soaring tent-like, acre-sized canopy that covers the new Sidney Myer Music Bowl in Melbourne, Australia. A jury of American architects was so impressed with it, in fact, that it gave the $25,000 Reynolds Architectural Award to the Australian firm that created the structure shown on this month's cover and detailed on pages 66 and 68. This novel use of aluminum might find application in other types of structures.

•

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Modern Metals

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Letters

WHO MAKES ALUMINUM WEATHERVANES?

Sirs:

In one of our recent consumer advertisements, in which we featured aluminum uses on the farm, an aluminum weathervane was included. Since then we have had numerous requests asking where aluminum weathervanes may be purchased. Perhaps we should have omitted it because we have been unable to direct the inquiries to a manufacturing source.

Do you know if any firm is manufacturing weathervanes.

"L"—New York

MM — No, we don't, but perhaps some reader can help "L"? This could well be a good product for some aluminum building product manufacturer to start making.

TUBE-IN-STRIP

Sirs:

We have noted the May issue and particularly the "Here and There" section. We refer to the item on "Those Clever Russians."

This reference to inflatable material is a subject that you covered very thoroughly in 1956 with a cover story when Revere introduced Tube-In-Strip to the public. We have been processing this material for the last three years in aluminum, copper and copper base alloys. One of the interesting applications has been the inflation of pipe lines such as you describe from Russia. In other words, we believe that this is the Russian copy of Revere-Tube-In-Strip.

For your information it is possible for us to produce tubing approximately 20" in diameter maximum and as small as 3/16 of an inch in diameter.

I only point this out as it does indicate progress in the application of our Tube-In-Strip product in other countries.

"C"—New York

MM—The Russians also invented the radio, television, and penicillin. You know how it is.

ALCOA, 1960

Sirs:

I have just completed the article entitled "Alcoa, 1960: A Billion Dollar Baby" in your June, 1959 issue. This was an excellent story, and I would certainly like to get a few copies of the reprint if they are available.

"J"—Washington

Sirs:

Some of our executives are very interested in obtaining reprints of your June article, "Alcoa, 1960: A Billion Dollar Baby" . . .

Would you please quote us on 700 reprints?

"Y"—Pennsylvania

MM—The latter request, from one of the biggest steel companies, indicates that the research, market development, and selling by the aluminum companies is being noted. That's a good sign.

Reprints of this 24-page article, "Alcoa, 1960: A Billion Dollar Baby," are available for free from Stanley Malcuit, Aluminum Co. of America, Alcoa Building, Pittsburgh 19, Pa.

VANASIL ALUMINUM PISTON ALLOY

Sirs:

Your article "Light Metal Castings on the Rebound" in the May issue was most inter-

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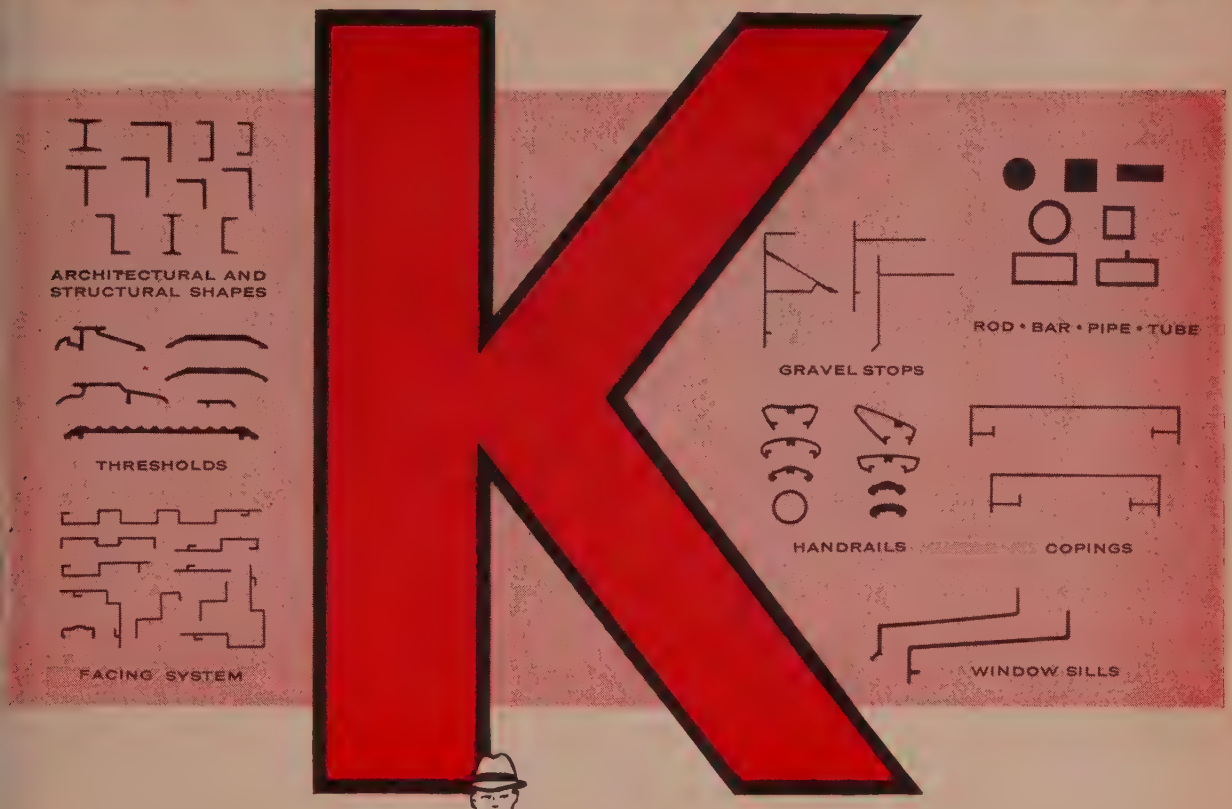

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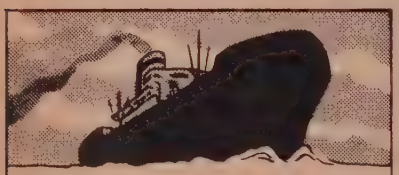

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BOX NO. 555 — Modern Metals, Tribune Tower, Chicago 11, Ill.

esting. We appreciate your report on our Hypereutectic aluminum alloy Vanasil and our wire insert piston. There are, however, two statements which are inaccurate.

On page 78 in the third paragraph, referring to Gillett & Eaton, you state "Vanasil has wear resistance superior to cast iron." This is not true. The wear resistance of Vanasil is close to that of cast iron.

You report that 30% of our aluminum casting output is pistons. This is an error. Pistons comprise all but 30% of our output in the aluminum foundry.

We have called these discrepancies to your attention only because we feel sure you want to have the correct information.

"C"—Minnesota

MM—Glad to correct the errors.

WANTS EQUIPMENT; MATERIALS FOR CLEANING ALUMINUM

Sirs:

I have noticed in your "Letters" section that you answer specific questions or refer the answers to particular sources.

We would like to get information on mechanical equipment and chemical compounds which could be used to clean aluminum coil in gauges from .016" to .081". We would appreciate it very much if you could refer us to the proper people.

"W"—Ohio

MM—We have advised several suppliers of equipment and materials used for cleaning aluminum coil, and these Modern Metals' advertisers have perhaps already been in touch with you.

For a complete rundown on all types of finishes, coatings, cleaners, etc. for light metals, see our special Light Metals Finishing Issue this fall. We're shooting for the most complete analysis of finishing equipment, materials, and procedures ever published. It should be a good issue.

WANTS BIG ALUMINUM TOOL BOXES

Sirs:

We have been referred to you as a possible source for large aluminum tool boxes. The size we need is 8 feet long by 13 inches wide by 18 inches high.

We are in the plumbing business and have need for a strong, yet lightweight box in which to carry our tools.

"H"—Indiana

MM—Sorry, but we don't have aluminum tool boxes—in fact, we don't make any type of boxes. We're even sorrier that we don't know of any firm making boxes as big as you need.

Seems that there should be a good business for a fabricator who would come up with a line of lightweight boxes for different uses. It could be as good as the aluminum tote box business.

VACUUM DIE CASTING

Sirs:

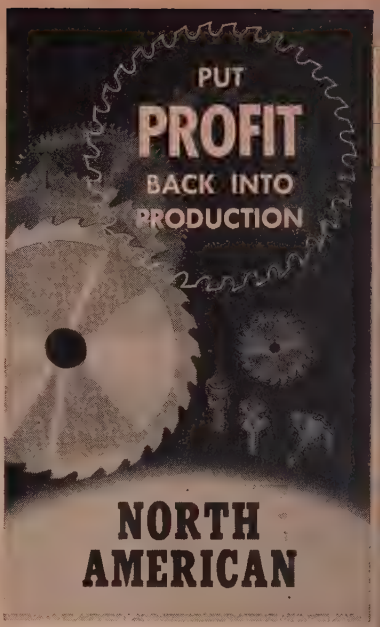
I have not noticed articles on vacuum die casting in your magazine. If articles have been published by you or if you know of articles in some other publication, we would appreciate receiving the names and dates.

Do you know of any manufacturer who makes equipment for vacuum die casting?

"F"—California

MM—Lots of development work going on in vacuum die casting and some of these days there will be big news on the subject.

We haven't published anything on vacuum die casting because nothing significant has come to our attention. Your best bet for this type of information at the moment would be through die casting equipment manufacturers. We have sent you a list of these firms.



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you can improve your product

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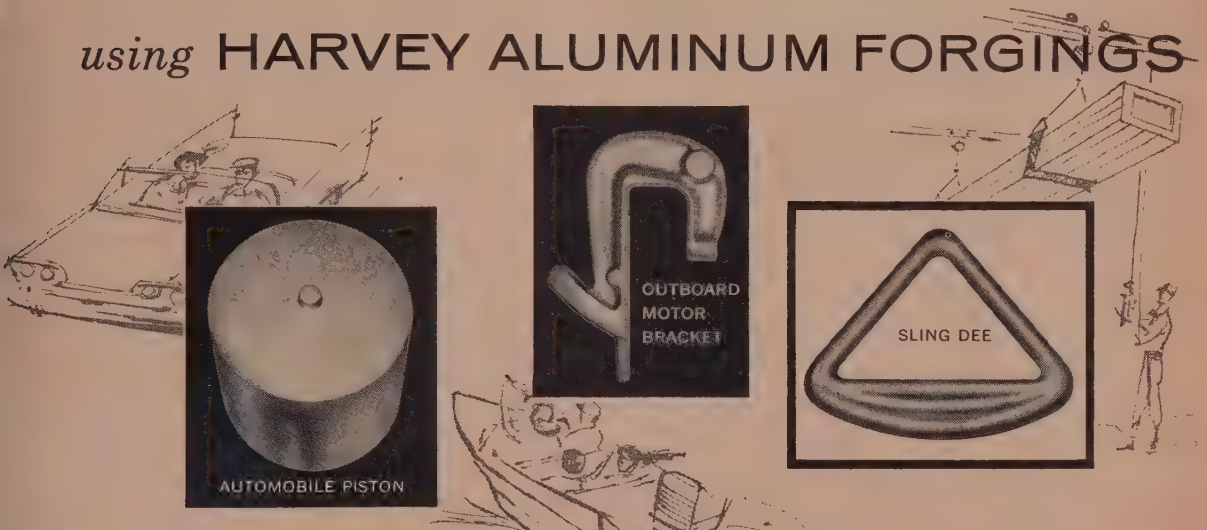

nvestigate the use of Harvey Aluminum Forgings for ritical metal parts. Forgings offer durability, maximum esistance to shock, high strength, excellent surface finish, nd other properties unobtainable in cast form. And in luminum, you benefit from a high strength-to-weight atio, attractive appearance, maintenance freedom, easy nachinability, broad design flexibility, plus other inher- nt advantages.

The next time you have a problem with a cast component, or a steel or brass part, check into Harvey Aluminum Forgings. You're sure to improve your product; you'll undoubtedly gain the competitive edge you're looking for; and there's a good chance of reducing your manufacturing costs. For technical or design assistance, call a Harvey forging specialist listed under "Aluminum" in your directory, or contact the general offices in Torrance, California. This advisory service is available without obligation . . . that's their job.

A major independent producer of quality aluminum in all alloys and sizes: Pig, ingot, billet, rod and bar, pipe, tube, hollow sections, press forgings, forging stock, hand forgings, impact extrusions, electrical bus bar, structurals, special shapes, light and heavy press extrusions, screw machine and other aluminum products. Similar products in titanium, zirconium, and steel. HARVEY ALUMINUM SALES, INC., Torrance, California

HARVEY Aluminum

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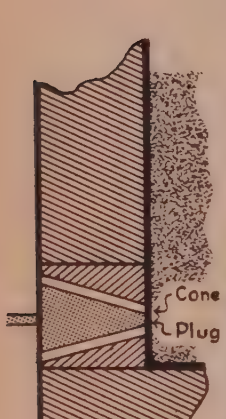
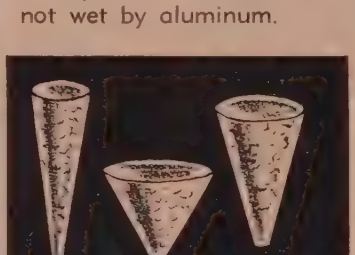
WRP-X Refractory Cones to Fit TAP HOLE PLUGS in Reverberatory Furnaces

These hollow, resilient cones, made of refractory fiber and inorganic bond, are easy to use, easy to remove. We can produce them in any shape, size or quantity.

We also manufacture special shapes to order — tubes, floats, etc. This material is not wet by aluminum.





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1209 LEVEE STREET, DALLAS, TEXAS
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Telegraph: BGJ FAX DALLAS Teletype: DL 761

Here and There

Home, Sweet (Aluminum) Home » » If Alcoa's Sam Fahnestock has his way, tomorrow's home interiors will make present-day aluminum applications look skimpy indeed. He spoke to a group of furniture manufacturers and buyers at the Merchandise Mart in Chicago last month, and his forecast was a glowing one. Aluminum will be used for interior wall skins; rug and wall fabrics will be sources of heat. Sculptured room dividers, lighting systems, sinks and tubs are some of the other future applications — all because of aluminum's light weight, corrosion resistance and virtually unlimited range of color and texture possibilities. Fahnestock predicted that the scope of future aluminum uses would encompass interior home structure, furniture and appliances, decorations and accessories, as well. Other possibilities: Wallpaper, shade cloth, and complete auxiliary structures such as cabanas or summer houses — available in do-it-yourself kits.

Big Step for Ti » » Titanium Metals Corp. of America reports the issuance of an ASME Boiler Code which covers use of titanium in unfired pressure vessels. Now insurance coverage of chemical process equipment made of titanium will be routine, eliminating costly special investigations hitherto called for when titanium was used. Issuance of the Code also enables state building inspectors to approve such equipment as titanium heat exchangers, heating coils, tanks and similar assemblies, Timet said. The Boiler Code spells out specifications for Timet's commercially pure titanium grades Ti-45A, Ti-55A, and Ti-65A for internal pressure applications and Ti-65A for cylindrical and spherical titanium vessels employed under external pressures. Also included are welding requirements, inspection and stress relief procedures, and allowable stress values at titanium metal temperatures up to 650°F. Copies of the Code are available from Timet.

Aluminum Blasts Off » » Aluminum is proving to be as vital to the missile program as it has been in airplanes, according to an article in *Missiles and Rockets* magazine. "The metal is used in almost every type of missile component and support equipment — from solid propellants to warheads, from the largest missile hull to the tiniest electronic component," the article said. "Aluminum parts carry, fuel, launch and track today's missiles and space vehicles." Surprisingly, Kaiser Aluminum's list of missiles and aluminum applications therein hasn't changed much from the list carried in Modern Metals a year ago April. We expected the intervening months to produce a smaller list that would include some missiles and rockets identified as operational. Of particular interest is author Paul Means' report that the Department of Defense last year purchased 342,202,000 pounds of aluminum, 24,451,000 pounds of which were specifically designated for the A-2 missile program. This year will see the aluminum tonnage drop—estimated DOD purchases being

CREDIT IT TO FOIL

CONTOUR BEDS FOR OUTER SPACE

TO PROTECT AGAINST THE ENORMOUS GRAVITATIONAL FORCES ENCOUNTERED DURING TAKE-OFF AND RE-ENTRY, ROCKET PASSENGERS WILL RIDE IN INDIVIDUALLY TAILORED, BED-LIKE SUPPORTS. THESE ARE CONSTRUCTED BY COVERING THE ASTRONAUT'S SPACE SUIT WITH ALUMINUM FOIL. THEN A PLASTER CAST IS MOLDED TO THE EXACT SHAPE OF HIS BODY.

HIDDEN GUARD

FOOD PACKAGES PRODUCED WITH ALUMINUM FOIL INNER-WRAPS PROTECT AGAINST MOISTURE AND INFESTATION IN HOT, HUMID CLIMATES UP TO TEN TIMES MORE EFFECTIVELY THAN ORDINARY PAPER CARTONS.

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LORISTS AND NURSERYMEN NOW USE ALUMINUM OIL POTS FOR PLANTS AND SHRUBBERY. LIGHT-VEIGHT, EASY TO STACK, CLEANER—FOIL POTS LIMINATE BREAKAGE, KEEP ROOTS COOLER, EALTHIER.

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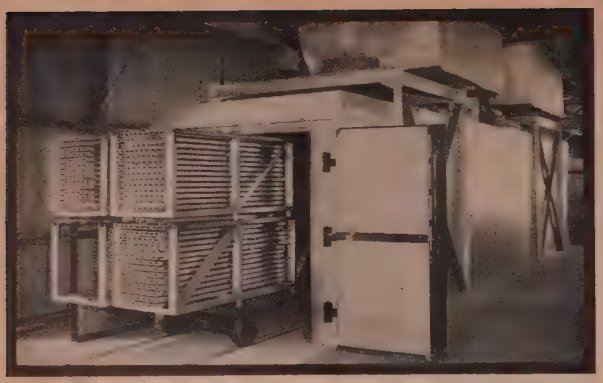

carl mayer Designs and Builds Better ALUMINUM Extrusion AGEING OVENS

This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

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Descriptive literature and working samples on request.

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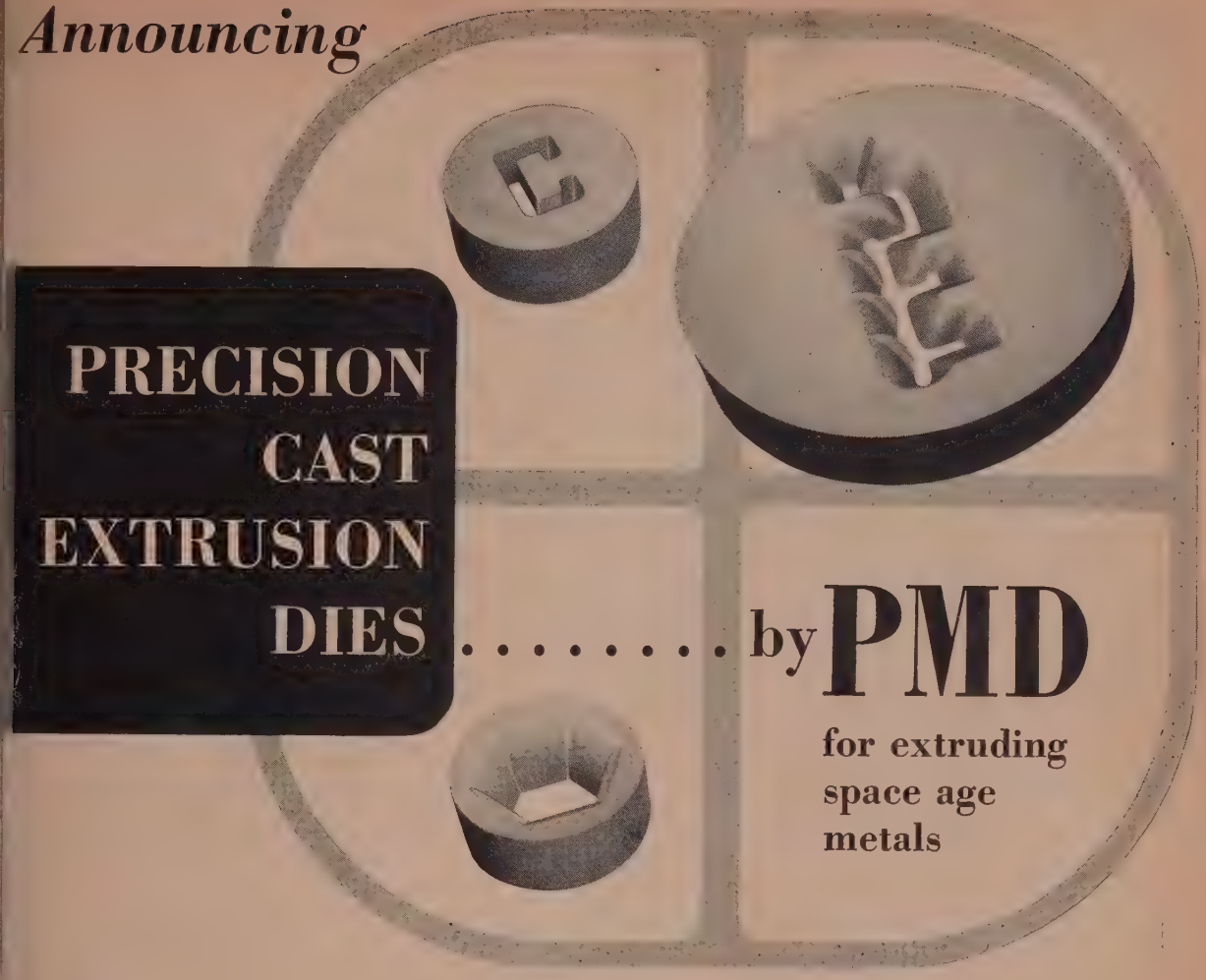
307,492,000 pounds, of which 19,199,000 will have been tagged for missile use. But the writer reports the expectation that combined aluminum purchases of DOD and the National Aeronautics and Space Administration will soar in 1960 when various missiles and space vehicles go into quantity production. The tonnage will help offset declining aluminum purchases for military aircraft. A sizable percentage of the aluminum purchased for the program, incidentally, goes into a wide range of ground support installations.

Challenge From Moscow » » Report is that the Soviet government is turning to nepheline as a new source for aluminum. This sodium aluminum silicate ore is reported to yield only 50 to 65% of the alumina content of bauxite, but the Russians have lots of it, while their bauxite deposits are limited. They're counting on a new extraction process and considerably beefed up electric power facilities to give them a 3.3-million ton aluminum industry by 1965. U. S. aluminum production facilities have passed the 2.2-million ton mark and are moving steadily toward 3 million. If the Russians are striving for world leadership in aluminum production, it will take some doing to close the gap by 1970. Looks as though a rough battle for foreign markets will be shaping up before then, though.

Looking Up in Africa » » The new republic of Ghana will have no trouble in its quest here for the wherewithal to finance its projected basic aluminum industry. It has money in the bank — thanks to its major crop, cocoa — and the U. S. is anxious to strike a solid counterblow against Soviet moves in Africa. So we're poised to extend a $100 million loan toward the construction of three dams and related power stations and transmission lines along Ghana's Volta River. Often pronounced impractical in the past, the huge project takes on a rosy hue following Kaiser engineers' verdict that economical power is procurable. The Kaiser firm will now start construction of the first dam, while all the major primary producers are reported to be thinking in terms of a combined smelting venture. It doesn't appear as though the young republic is taking much of a gamble in deciding that it wants aluminum to become its second source of revenue, even though there probably will be times when aluminum's behavior in the market will be as erratic as cocoa's.

Worthwhile Junket » » Scenic British Columbia and the Kitimat smelters of Aluminium Limited are an objective made to order for a trade group bent on satisfying its aesthetic needs as it absorbs additional information about its industry. The Aluminum Extruders Council will meet during the week of August 10th at Vancouver and will make an overnight trip to Alcan's huge smelter. The 400-mile chartered airplane trip will fly the extruders along the beautiful Coast Range Mountains, will give 'em a birds-eye view of the Kenney damsite and lake which is about the size of Connecticut. Limited's guests will then tour the smelters. After a five-hour scenic boat trip, they will inspect the huge underground hydro-electric power plant at Kemano which serves the Kitimat project by a 50-mile transmssion line. The extruders will also tour the Kitimat docks and townsite.

Announcing



PRECISION CAST EXTRUSION DIES . . . . . by PMD

for extruding space age metals

NOW, in our own Shaw Process foundry, PMD is producing precision cast dies for extruding the new space-age metals such as titanium and A286 stainless steel, as well as copper base alloys and steel alloys.

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Extruders of these tough metals report closer tolerances, longer die life, superior die performance, and trouble-free operation with precision cast extrusion dies by PMD. These high temperature dies are designed and produced to the same high standards of craftsmanship that have made PMD the symbol of quality and dependability in aluminum extrusion dies.

PMD has the men, machines and experience to solve your difficult extrusion die problems.

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Alan P. Benson, President

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New Enterprise

A hollow casting made in the shape of a standard brick and louvered for hard-to-ventilate places is known as the Riesner Aluminum **Vent Brick,** and manufactured by Riesner Vent Brick Corp., 353 E. 78th St., New York 21, N.Y.

Rust-proof aluminum hooks travel on self-lubricating nylon slides hidden in a square track in an aluminum **shower rod** made by Magnalum Products, 2460 N.W. 78th St., Miami, Fla.

Fire hazards from cigarettes and matches in institutions are cut down by the installation of **cast aluminum canisters** designed to be partially filled with water. Over 20 different models are made by Standard Industrial Products Co., 3527 Farmington Rd., Peoria, Ill.

Davis Engineering Corp., Elizabeth, N.J., maker of heat exchangers, evaporators and distillation equipment, has been purchased by American Metal Products Co., 5959 Linsdale, Detroit, Mich., as part of the latter company's program "to diversify its metal working into fields other than automotive parts." Davis' customers are shipyards, and chemical food manufacturers.

One-piece, self-locking **fasteners** for supporting wire bundles, tubing, panels and fixtures in airplanes and ships are made from aluminum drop forgings under a Boeing license by Western Sky Industries, 21301 Cloud Way, Hayward, Calif.

Steel disc forgings in four distinct grades, used in production of **aluminum extrusion dies** and support tools, are stocked in the new warehouse facilities of Latrobe Steel Co., Latrobe, Pa., at Elston-Richards Storage, 43 Scribner Ave., N.W., Grand Rapids, Mich.

In-line **check valves** in JIC tube sizes from ⅛ to 1 inch are made in aluminum, brass and stainless by Kepner Products Co., 7301 W. 59th St., Summit, Ill. Standard working pressure for the line of Kep-O-Seal spring-loaded check valves is 3,000 lb. hydraulic, surge flow protected, according to the manufacturer.

An **insulated food carrier** made by Crusader Plate Co. Pty. Ltd., 653 Victoria St., Abbotsford, Victoria, Australia, consists of a steel base approximately 12½-in. diameter and 12-in. high and five aluminum bowls which fit inside. A similar carrier keeps one gallon of soup hot.

Revolving **outdoor lamp** and bracket for mounting are made in aluminum by Swiss Harmony Inc., 844 W. Adams St., Chicago 7. The Swiss Golden Beacon has four colored lenses and gold anodized finish which assures years of weatherproof, maintenance-free service according to the manufacturer. Power is furnished by built-in, synchronous motor.

Titanium standard **hydraulic fittings** provide 43% weight savings over equivalent alloy and corrosion-

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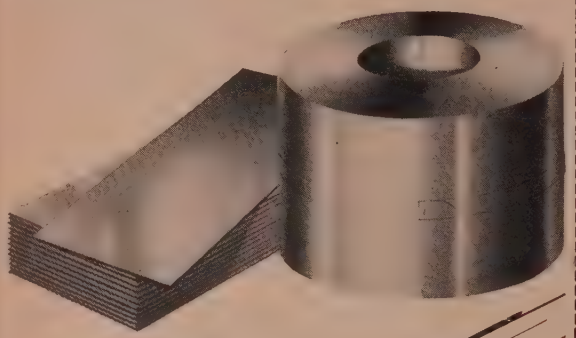

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resistant steel fittings, according to manufacturer, Vo Shan Mfg. Co., Div. of Pheoll Mfg. Co., 8463 Higue St., Culver City, Calif. Fittings are interchangeable wi AN and MS flared and flareless fittings.

A pair of **scales** enables highway officials to che weight of truck loads quickly and accurately. "Hi-Wa Loadometers made by Loadometer Corp., 1503 W. 4 St., Baltimore 11, Md., contain aluminum castings.

Variable displacement **hydraulic pump** is a self-co tained unit in a sealed 2-qt. aluminum oil reservo The 32-lb. unit is manufactured by Roberts Electr Co., 849 W. Grand, Chicago 22. Motor is 1½ hors power.

Corrugated aluminum **duct system,** developed Bert Tolbert, Inc., 3511 E. Belknap, Fort Worth, Te aerates grain in storage bins. Lower installation cos improved performance and maintenance-free operatio are advantages listed for the aluminum system whi replaces steel and expanded metal ducts.

The Brasco Mfg. Co. of Flat Rock, Mich., manufa turer of aluminum **store entrances** and other produc has moved to a plant one mile north of Monroe, Mic on Dixie Highway.

The Wagemaker Co., 566 Market, S.W., Grand Ra ids, Mich., has consolidated its **boat manufacturi** and sales divisions into a single organization, whi will "provide better service to the boating retailers a the public," according to Ray O. Wagemaker, pre dent. Aluminum models carry Wagemaker's Cadill trademark.

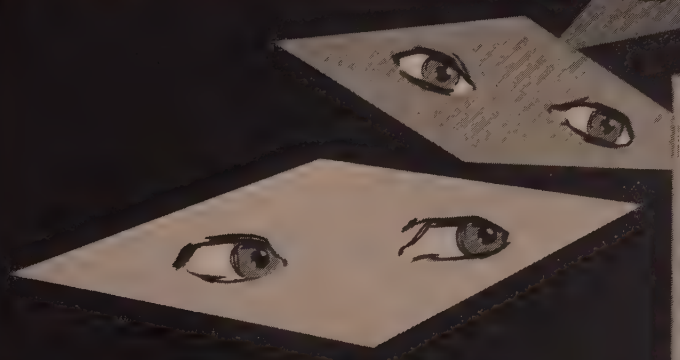
Aluminum **clothes hamper** weighs 9¼ pounds, 2 pounds less than a steel model of the same size. T manufacturer, Joy of California, 148 E. Virginia S San Jose, Calif., believes weight savings will be a maj merchandising influence with homemakers. Hamp are decorated with patterns of leaves, grass and butt flies laminated in washable vinyl trimmed in metall gold colored vinyl.

A line of general purpose **platform trucks** made magnesium in combination with other light all metals has been developed by Magline Inc., Pinconni Michigan. "Model F" platform trucks are made in lo capacities of 1200 and 2000 pounds.

A Scandinavian aluminum and copper concern h ordered a 4-high, high speed rolling mill installati for the manufacture of **aluminum foil.** Loewy-Hyd press Division of Baldwin-Lima-Hamilton Corp., bui ers of the new unit, report that over 20 similar instal tions have been put into operation during the last fo years in various countries.

New York Air Brake Co. has formed a new found division at Watertown, N. Y., for the commercial p duction of gray iron, brass and **aluminum castings** wi associated foundry services such as pattern maki core making and heat treating. The Division will u existing foundry equipment. "Our equipment compa favorably with the facilities of larger commerc foundries," P. R. Fortune, general manager, said.

Discriminating Eyes . . .



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The unblemished, soft gold finish of this part is truly attractive. It has to be because this is a thermostat housing for air conditioning systems that finds its way to the walls of fine homes, exclusive clubs, hotels, restaurants and other such establishments. Manufacturer of the air conditioning controls is White-Rogers Co., St. Louis, Mo.

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4665 Frankford Avenue
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CUmberland 9-9212

Useful Data

"New Horizons in Aluminum" is an 8-page, 2-colo booklet describing and illustrating the extruding an roll forming facilities of R. D. Werner Co., Inc., at it plants in Greenville, Pa., and Oshawa, Ontario, Canada In addition to a brief description of the aluminun extrusion process, the booklet contains charts showin standard manufacturing limits for extruded shapes an specifications of roll formed shapes in aluminum, stee and stainless steel. Numerous photos depict the com pany's operations, ranging from billet casting, extrud ing and roll forming to secondary operations such a bending, welding and riveting. For a copy, write t S. R. James, Industrial Sales Manager, R. D. Werne Co., Inc., Dept. MM-3, Greenville, Pa.

Extensive metal finishing facilities are dealt with i two 2-page brochures brought out by Pyro Metal Fin ishers. The first, "You Can Get Them All at Pyro," briefly describes such finishes as Alumilite, Electrofilm Bonderite, Parkerizing, Pylumin, hard chrome plating special treatments for magnesium, Alumilite Hard Coat, and other processes. The second brochure dis cusses "Pyro's semi-automatic method of producing anodized aluminum," plus the Alumilite Hard Coa process. Both brochures may be obtained from Dr. Paul J. Brodeur, vice president, Pyro Metal Finishers, Div of Baker Industries, Inc., 10 Empire St., Newark 12, N.J.

Foil converting processes and end uses are compre hensively treated in a 244-page case-bound book pre pared by Kaiser Aluminum & Chemical Sales, Inc. Th book is designed to suggest new foil products an efficient production methods for traditional foil items Included are over 350 photographs and drawings, a index, cross-references, table of contents and glossary The first four chapters present a panorama of en uses, a discussion of foil surface design technique description of aluminum foil production, and dat on properties and availability. Last six chapters de scribe the basic converting processes and equipmen for foil including: laminating, extrusion coating, coa ing, printing, forming and fastening. Over 200 manu facturers contributed information or illustrations. Th book is available without cost if requested on com pany letterhead, or for $12.50, from Technical Servic Dept., Kaiser Aluminum & Chemical Sales, Inc., 192 Broadway, Oakland 12, Calif.

Industrial Blind Expansion Rivets are described b E. I. Du Pont De Nemours & Co. in a 12-page folde Features of Du Pont rivets include one-piece constru tion and presence of a small chemical charge in th rivet shank which causes the rivet to expand upo application of heat and sets it firmly. Simple install tion instructions with riveting iron are given. Rive of 5052 aluminum come in four diameters from ⅛ inc to ¼ inch. The 5056 aluminum rivets are availabl in diameters of .202-in. and .263-in. Charts give specif cations for these rivets. The use and maintenance o riveting irons is discussed. For copies of the bulleti

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write to the advertising dept., E. I. Du Pont De Nemours & Co., Explosives Dept., Wilmington 98, Del.

Al-Fin Molecular Bonding of dissimilar metals is the subject of a 20-page folder subtitled "A Design Guide for Bi-metallic Casting." Photomicrographs show bonds of aluminum to stainless steel, steel, nickel, titanium, and cast iron. Over 50 illustrations show various bonded bi-metallic applications in diverse industrial fields, for example in brake drums and hydraulic parts. How greater heat transfer results from molecular bonding is explained. Technical data for the product design engineer and design data are final sections of the booklet along with a list of firms licensed to use the Al-Fin process. Complimentary copies will be furnished by M. V. Little, Al-Fin Division, Fairchild Engine and Airplane Corp., Deer Park, L. I., N. Y.

The Package Stock Guide to Statesville Inventory, SPG-3, has been newly revised by Southern Screw Co. The guide outlines the packaged items, sizes and finishes regularly carried as standard in Statesville's 500,000 gross shelf stock of fasteners. Categories previously listed in SPG-2 have been expanded and new items included in this 8-page edition. Copies may be obtained by writing to Tom Andrews, Southern Screw Co., P.O. Box 1360, Statesville, N. C., on company letterhead.

The Macromates, a new group of compounds for producing chromate conversion coatings on aluminum as well as zinc and cadmium plate and zinc base die castings are fully described in Technical Data Sheet No. 76, a five-page usage and instruction sheet prepared by MacDermid Inc. Macromates, most of which are dry powders that are easy and safe to use, reduce brightener cost, and corrosion resistance, improve product appearance and provide a good base for other coatings. For copies of the data sheet write to George Kastner, Jr., MacDermid Inc., Waterbury, Conn.

Wire, rod and shapes now available in titanium, zirconium, tantalum, columbium and other special metals are discussed in a new 8-page brochure issued by Johnston & Funk Metallurgical Corp. The booklet discusses the firm's electrode vacuum melting techniques, and illustrates manufacturing and research facilities. Melting, methods of billet conditioning, rolling, wire drawing, cleaning and pickling, wire straightening, strip and foil rolling and laboratory techniques are reviewed. For copies address Johnston & Funk Metallurgical Corp., Dept. A, West Kemrow Ave., Wooster, Ohio.

"Alcoa: 1960," an article published in the June issue of Modern Metals, has been reprinted as a 28-page brochure by Aluminum Co. of America. While this feature reflects company policies and management viewpoints related to many facets of the business, special emphasis was given to the firm's research, product development, and sales and promotion activities. Address Tod M. Hunt, advertising manager, Alcoa Building, Pittsburgh 19, Pa. for copies.

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Photo courtesy LITHO-STRIP CORPORATION, Chicago, Ill.

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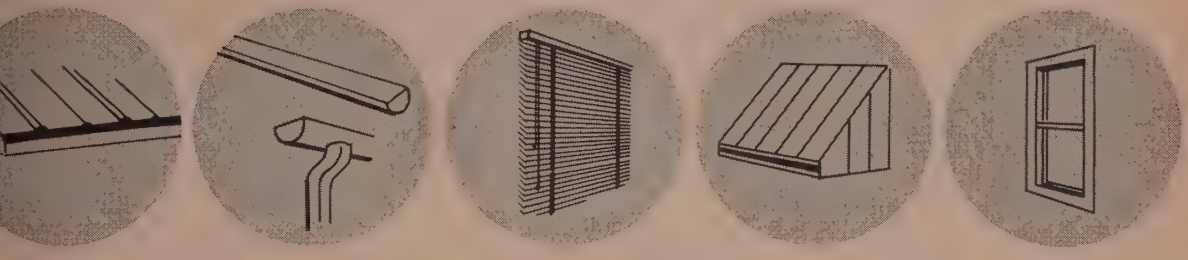

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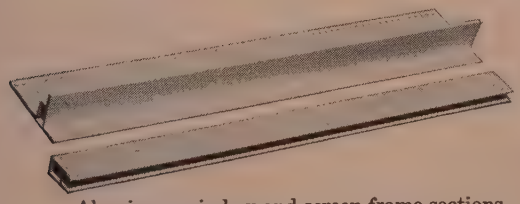

Aluminum window and screen frame sections Bonderized, painted and formed after painting. No breaks in finish anywhere! (Courtesy, Security Co., Detroit, Mich.)

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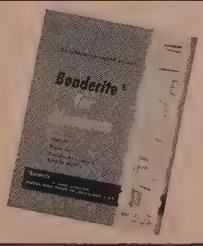

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SIMPLE COLD FORMING OF ALUMINUM SHEET AND SHAPES

Improvised tools can often be used for fabricating aluminum — particularly on short run jobs — if you know the fundamentals. These factors, plus some useful fabrication tips, are presented in this study by Aluminium Laboratories Limited, Banbury, England, a member of the Aluminium Limited group

THE continuing use of aluminum in an ever-widening range of manufactured goods has created a need for information on handling the metal. Many firms are well acquainted with aluminum and are equipped with modern machinery for converting it into final products. Others lack not only the requisite knowledge of the metal, but also the power tools usually employed in cutting, forming and joining.

This report outlines the basic considerations in forming aluminum and shows by example how simple equipment can be used to form sheet and sections into the shapes required for finished products. In some cases, the equipment described has been improvised.

Most of the operations described can be carried out by hand. But in cases where some of them can be made easier by the use of simple powered equipment, and occasionally of more elaborate machinery, this has been indicated.

The term "aluminum" is used throughout to denote both the pure metal and its alloys. Before discussing forming operations it is essential to examine these alloys and their behavior under forming.

Know Your Alloy

Commercially pure aluminum of 99¼% purity (1100) is widely used in decorative work, packaging, utensils, and other applications where good appearance, durability, and ease of forming are required without high strength. Its mechanical properties can, however, be improved very considerably by the addition of small quantities of other elements and subjecting the resulting alloy to mechanical working or heat treatment.

These alloys divide into those whose properties derive from controlled mechanical working (non-heat-treatable alloys); and those whose properties are improved by thermal treatment (heat-treatable alloys). Before any forming operations are planned, the alloy and its initial temper must be known, as both have a vital influence on the degree to which the metal can be deformed.

Forming is essentially a type of mechanical working and as such will change the characteristics of the metal by work hardening. The material must, therefore, be sufficiently soft to accommodate the increase in hardness caused by the forming operation. If it is not sufficiently soft it will break or crac before the bend is completed.

Some attempt is made in the followin pages to indicate the extent to whic forming can be carried out, but becaus of the many variables it is rarely possibl to give exact rules. Where experience lacking, initial tests on small pieces o the material may be desirable to estab lish the limits of a particular operation

When Cutting Aluminum . . .

As a preliminary to bending, ordinar cutting is often necessary and can b carried out very easily. Aluminum ca be cut by a hacksaw, bandsaw, shear, o press — in fact with all normal work shop cutting tools. Plenty of standar soluble oil coolant should be used whe sawing and the form of saw tooth shoul give ample "way" for removal of swar As high a cutting speed as possibl should be used with moderate pressure

There is a tendency for the harde alloys to bend or distort under pressure which may make the shear or blankin press less effective than the saw. If used these machines should be carefully se up, with sharp tools, minimum clear ances, and a generous leading angle t

Hands of the Giants

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give a rapid cut with minimum pressure.

In drilling, the drill should have ample means for the swarf to disperse. Drilling speed should be high, with ample coolant and light pressure. Blind sawcuts, especially those performed prior to bending, should end at a drilled hole (see Fig. 6). This will avoid damage to nearby faces, as well as local cracking during bending which may tear away the metal at the end of the cut. The hole drilled at the end of the sawcut may be of quite large diameter, increasing with the size of notch. After bending, the sides of the hole will become the edges of the notch.

Dressing of sawed faces by filing should always be carried out, not merely as a finishing operation, but also to avoid stress concentrations at saw or file marks on the face during bending. Sharp edges should be rounded off and smoothed, as scores or marks on the surface of the material will change the flow of the metal and concentrate stresses. For this reason, care should be taken in handling or storing so as not to scratch, dent or bend aluminum.

The use of a scriber should be avoided; a pencil mark will usually show up adequately on the bright surface. Cleanliness, both of tools and of the shop, is important to avoid scratching the metal with steel filings or abrasive dust. All bending tools — especially hammers, anvils, formers and spikes — should have polished surfaces, free from scores, sharp corners or roughness.

The radius of the curve limits the work, and it should be remembered that the radius on a minor shoulder or gusset may be much sharper than the radius of the rest so that this corner will govern the amount of bending allowable. The radius, or sharpness of the bend — not the amount of change of direction — is the important factor. It may be that the radius can be altered to assist bending without altering the final result.

■ ***Fig. 1. One method of supporting a top hat section in the machine during bending. Unless sections have very thick walls, or are bent around gradual curves, support must be given to the enclosed part to prevent buckling.***

To Cope With Springback . . .

In bending almost any material, there will be some springiness which will cause it to try to return to its origina shape. This is known as springback an the work must be bent somewhat mor than the specified amount to allow fo it. Aluminum can have a fairly larg amount of springback (from 0 to 20% depending on alloy and temper) and it effects should always be allowed fo How much to allow depends on th alloy, temper, shape, sharpness of th bend, and method of operation. Th allowance is best found by experimen

Sections may include tubes, variou shapes, channels and other shapes hav ing an unsupported enclosed part. Un less these sections have very thick wall and are to be bent around gradual curves the enclosed part must be supporte during bending to prevent buckling.

Once this support has been given the section may be treated as a soli bar. Where the enclosed part can b reached from outside (as in channel and top-hat sections), support durin bending can be incorporated in th bending machine (see Fig. 1).

With totally enclosed sections such a tubes, support must be arranged befor bending. The section must be filled wit some material which will not give t the bending load but will bend wit the section. In addition, it must be fai ly simple to put in and to remove afte bending. If it has to be melted it i most important that its melting poin be low so that there is no possibility o the aluminum being overheated.

It is common practice to fill pipes an other hollow sections with pitch, resin low melting-point metals such as Wood' metal or some proprietary material such

■ ***Fig. 2 shows two improvised methods of bending simple aluminum shapes. The device shown in "A" consists of a simple former attached to a plank. The operator stands on the plank and lifts the end of the section to a mark on the vertical post. A length is marked off by pencil along the section and the work is moved to this mark before the operation is repeated. In the example shown here, the symmetrical channel was subsequently slit to give two angle sections. The relatively heavy I-beam in "B" is being bent by an impromptu method employing a mechanical jack for power and the leg of a machine for support. An aluminum section has been keyed into the I-beam to serve as a "rest" for the jack head.***

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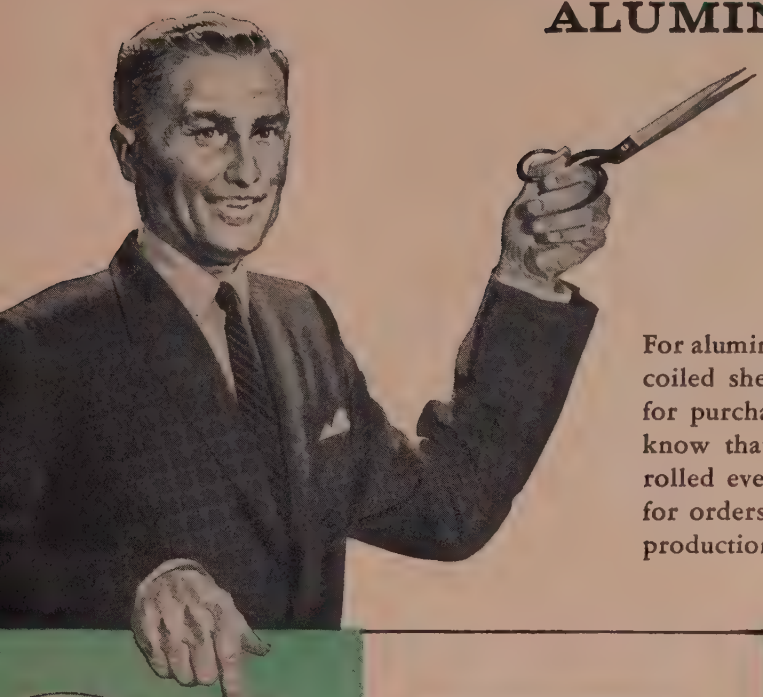
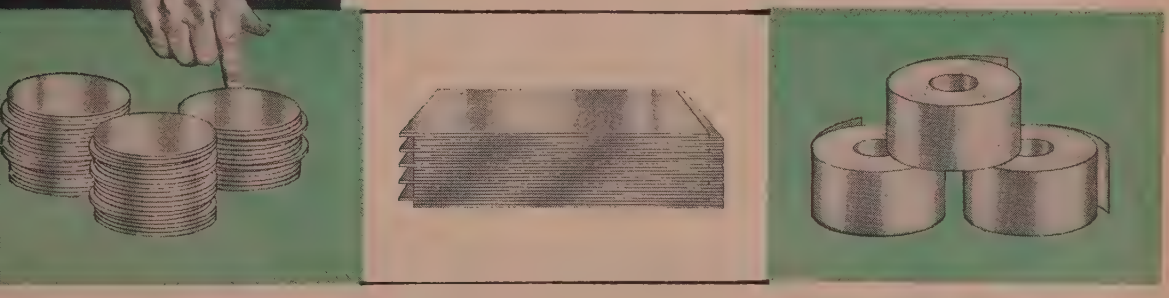


For aluminum sheet in any form—flat sheet, coiled sheet or circles—those responsible for purchasing and manufacturing should know that every alloy Fairmont offers is rolled every working day . . . no waiting for orders to accumulate for scheduling a production run.



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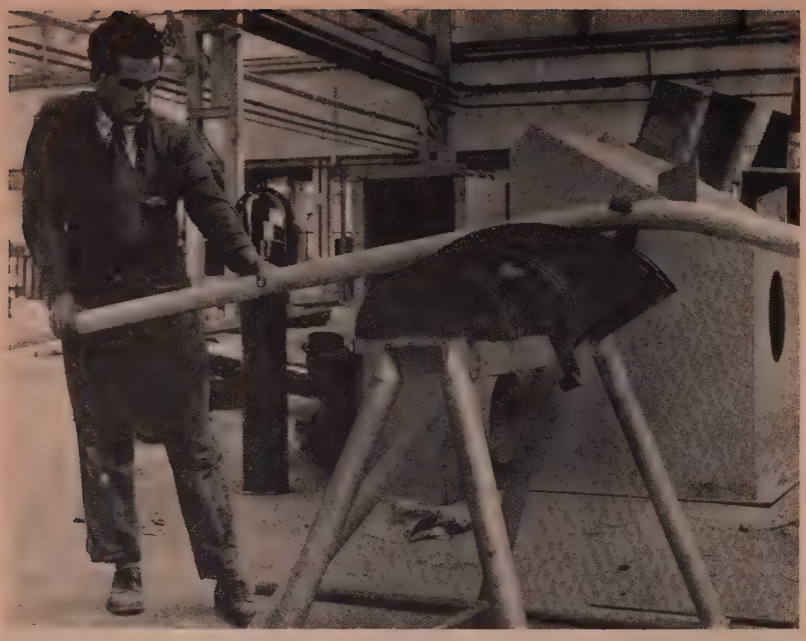


■ *Fig. 3. This common tube bender employs a hook as a clamp and different sized formers to produce a range of bend radii. The work itself acts as the lever.*

as Cerrobend which can be poured into the section in a molten condition. Fine foundry sand may also be used, but make sure that there are no pockets.

Mechanical devices are also used. The chaplet, a string of balls of a diameter to fit the internal core, is drawn through the bend during forming so that the diameter of one of the balls is passing the point of greatest bend and the other diameters are continually smoothing the tube. Another device is the snake, a coiled spring used in much the same way. A rope of short ends of insulated cable, or even a length of wire rope, is used successfully to maintain the shape of a pipe during bending.

Two Improvised Benders

Numerous types of pipe benders can be used for the bending of aluminum sections. They are simple to operate and a bend can be repeated again and again by comparatively unskilled operators once the operating details have been set. For repetition work they are essential.

For experimental work, or where a single isolated bend is required, simplified machines can be improvised.

Two simple methods of bending are illustrated in Fig. 2. Use can be made of the leg of a machine as in Fig. 2-B, and force is applied by a small jack. Some simple thick-walled sections and those already stiffened internally may be formed without additional support, but usually some reinforcement is necessary.

Generally, wood packing is made to fit the shape accurately. The packing inside the clamp should have enough length to hold a substantial part of the work, should grip all flanges firmly, and should have all corners rounded off to avoid marking the work when it moves under bending.

A type of bender which has been successfully used for light aluminum sections is shown in Fig. 2-A. Here the section is placed in the former which is clamped to a plank. The operator stands on the plank and lifts the end of the section to a mark on a vertical post. A length is marked off by pencil along the section to be bent and the work is moved to this mark before repeating the operation. The plank is an anchoring device and the post is a height gauge.

The work is bent in stages at successive intervals along its length until the required profile is achieved. Angles and Z sections tend to twist if shaped by this method, but satisfactory results are obtained with symmetrical sections.

When a section is being bent, all parts will try to avoid a change of length. Thus the web of a T section will bend, but the flanges will tend to turn up or down in an attempt to avoid stretching or compressing. This secondary movement must be held by the packing in the clamps. Similar arrangements should be made where the pack head or other mechanical aids meet the work, as shown in Fig. 2-B.

In these types of benders very little control of the bend shape is provided, the curve being shaped by the operator by eye. Nevertheless the natural "give" of the material will produce a smooth curve in fairly substantial sections.

Improved versions are shown in the benders in Fig. 3 (where a shaped former gives the desired radius), and Fig. 4, where a further refinement has been introduced. Instead of using the section as a lever to bend itself around the former, a separate lever presses it onto the former right around the bend.

A slipper is needed between the lever and the work and it should be a fit on the work and be well lubricated with grease. This method has the advantage of giving an even leverage to the bend of making bends in any length of material, and of giving greater accuracy.

The bender shown at the top of page 28 is adjustable for different radii by interchanging the formers.

It consists of a lever arm with a roller that is adjustable by screw thread. This is located with respect to the radiused former by a pin passing through a bearing bolted to the bench. The only other components are the slipper, shaped to fit the section, and a clamp for securing the end of the section, which is merely blocks of wood clamped to the bench.

Rotary benders incorporate a specially made slipper and former for bending of top hat sections with flanges inwards. This is more difficult than bending with the flanges outwards. The minimum radius obtained during an investigation of this method of bending a top hat section was 11 inches.

Another method of bending sections consists of raising the center part of the work while the two ends are clamped. The simplest version is the "Jim Crow" bender, much used on railroads. This is suitable for simple, heavy sections but care should be taken in packing the clamps and the jack to avoid bruising the metal.

Wood Packing OK, But . . .

In general the use of wooden benders formers and packings is quite satisfactory. When these require reinforcement either for strength or against wear aluminum sheet is satisfactory.

Bending is part of the art of the panel beater, a highly skilled trade practiced in almost every country in the world, and dating from ancient times. A good panel beater can produce a variety of bends of elaborate shape. Although he may have no previous knowledge of aluminum, his skill in copper and other metals can be applied to this metal with a little experiment. A beater can "swell" or lengthen the flange of a section to cause a bend, with consequent thinning of the material (see Fig. 5).

Although normal forms of presswork such as drawing and stamping are outside the scope of this article, the possibility of using an existing press for simple forming operations should not be overlooked. Hydraulic presses, in particular, may often provide a convenient means of applying leverage to a section for bending.

Sometimes the design of a job can

CHEMICAL PREPAINT TREATMENTS FOR METAL SURFACES

What they do, the types available, how they are applied

By J. H. GEYER, Manager, Product Development Dept., AMCHEM PRODUCTS, INC.

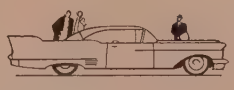
Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

Chemical *prepaint* treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

Basically, there are four types of chemical prepaint treatments—phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate.

Phosphoric Acid—Phosphoric acid cleaner combination materials are an example of economical chemical prepaint treatments. Amchem Deoxidine is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.

Iron Phosphate—Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances—water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine, Amchem's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.



Zinc Phosphate—Amchem Granodine is an example of zinc phosphating, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. Amchem Lithoform is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.

Amorphous Phosphate and Chromate—These coatings are the films produced by the Amchem Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, or mechanical spraying. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip or spray application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a deoxidizer in the line is needed.

For more complete information about any one or all of these chemical conversion coatings, contact an Amchem sales representative or write us at Ambler 24, Pa.

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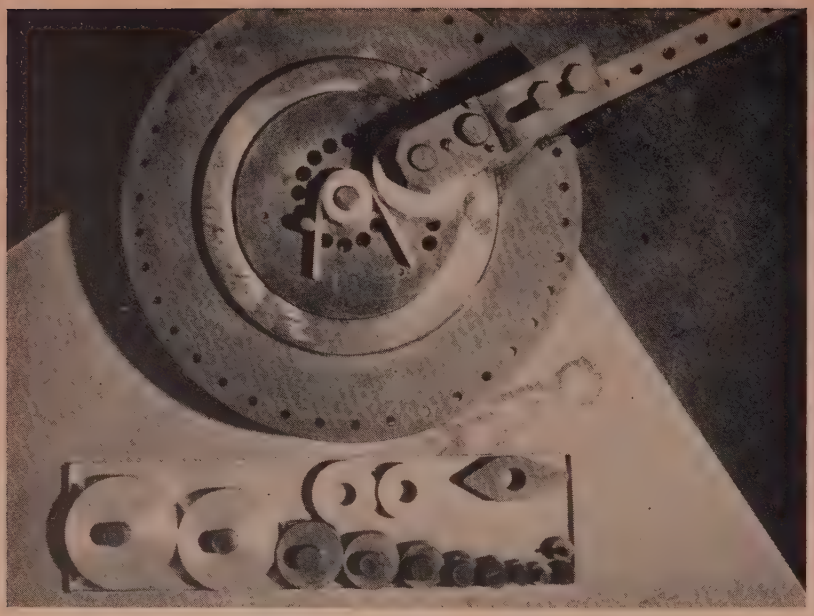


■ *Fig. 4. This bender is basically similar to that in Fig. 3, except that a separate lever is used to press the work against the former. Narrow strips are bent to close tolerances in this case. Note interchangeable formers.*

for a bend too sharp for the section used. A method of overcoming this difficulty is to cut notches in the outstanding flange. As mentioned above, such sawcuts should terminate in drilled holes to avoid cracking.

Examples of such cuttings are shown in Fig. 6 which illustrates bends in a T section and in a top hat section. Where to cut, and how many cuts to make will depend on the final design, but the general method of operation is shown. After bending, the section may be joined by welding or by means of a gusset plate riveted or bolted to the bend.

When Bending Sheet . . .

The general principles of forming as described for sections apply to a large extent to the bending of sheet. Both are simple, given the correct equipment, and both require a knowledge of the material and its properties. The most important consideration is to make sure that the radius of bend is within the capabilities of the material.

Guidance on the degree of forming which can be applied to sheet is available from the "minimum bend radius" quoted in tables of properties of sheet material provided by suppliers. These tables show that the bend radius is a function of the thickness of sheet.

As would be expected, thin sheet will usually bend to a smaller radius than thicker sheet of the same alloy. The initial temper also has an important effect; in general, annealed metal ("O" temper) can be bent flat through 180°, whereas in the harder tempers the minimum radius may be 2 or 3 times the sheet thickness. Due account must be taken of the bend radius in designing tools and fixtures for bending sheet.

Sometimes local working may be necessary to assist bending, and care is necessary to avoid marking or buckling of the metal. A well rounded mallet of wood, fibre or rubber should be used.

To make a straight bend across a flat sheet is normally a simple operation requiring two blocks of wood, clamps and a mallet. Curved flanging by hand is not much more difficult. In one method, the sheet is clamped between a pair of wooden formers and the edge is gradually worked over using a soft mallet. In another, the work itself provides support for the metal on one side and a hand-held backing piece gives support on top. The flange is formed by means of a rubber mallet.

The folding machine is the simplest mechanical device for forming straight line bends in flat sheet. It consists of a fixed part, to which is attached the upper blade. This acts as a former. The blade can be changed to suit the radius of bend required. The fixed part may also include a bed on which the sheet lies. The movable part carries the lower blade. It includes a handle and is generally made to move around the fixed blade. It is very substantially made to avoid springiness.

The sheet is clamped between the upper blade and the bed. The movable (lower) blade is then drawn upwards around the fixed portion and the sheet, thus forming the bend. Hand folders are available to handle most sizes and thicknesses of sheet and can be set to produce repetition bends accurately.

The press brake is a power operated machine for making straight line bends, but capable of producing a greater variety of shapes than the folding machine. In this machine, the framework is fitted with a former into which the sheet is placed. The moving part descends, carrying with it a matching former which is pressed into the sheet, thus forming the bend. The mechanism is broadly similar to a press.

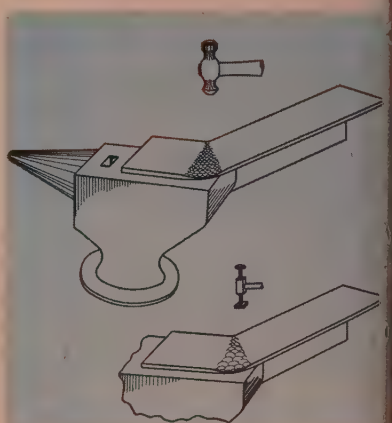
Beading and Flanging

Illustrated in Fig. 7 is a two-roll beading and flanging machine. A selection of rollers enables a wide variety of shaped swages to be formed in sheets for edging, beading and similar purposes. Both rolls are driven and can be adjusted for different sheet thicknesses. The lower roll is also adjustable outwards so as to overlap the upper one for flanging.

In its simplest form the three-roll bender consists of two driven rolls with a third roll adjustable in position in respect to the other two. Sheet passing through the driven rolls is defleced by the third roll and has a curvature imparted to it depending on the position of the adjustable roll. Setting of the adjustable roll at an angle with respect to the other two will give a conical form to the sheet.

While three-roll benders are mainly used for flat sheet, they can also be modified for sheet which has already been formed—for example, corrugated building sheet. In order to bend such material, support must be given across the profile. Consequently, the two driven rolls must be shaped to the correct profile. This can often be done by fitting wooden collars to the existing rolls or making temporary rolls from cast iron.

Where a sheet has to be curved in two



■ *Fig. 5. The ancient art of the panel beater can be used to produce a wide variety of bends in aluminum shapes. In this case, an angle is being bent by peening (top) and then planishing.*

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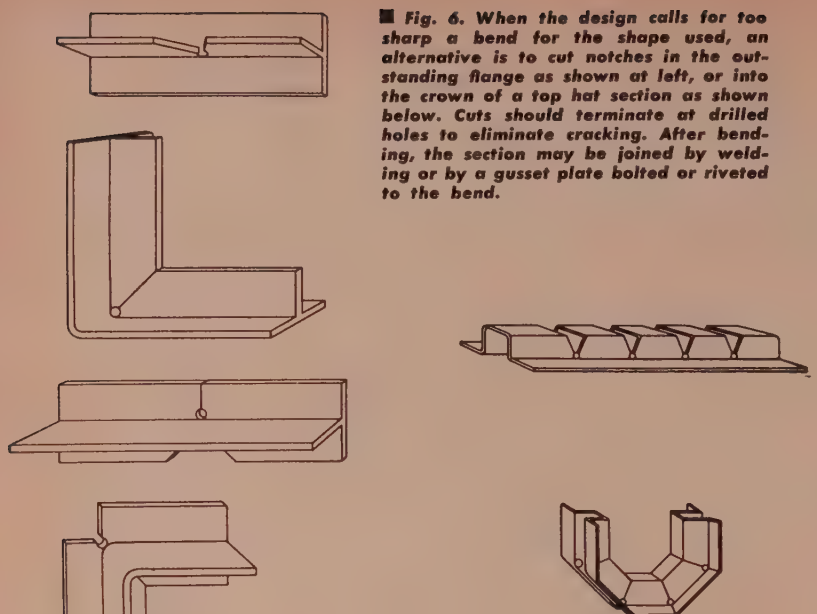


■ *Fig. 6. When the design calls for too sharp a bend for the shape used, an alternative is to cut notches in the outstanding flange as shown at left, or into the crown of a top hat section as shown below. Cuts should terminate at drilled holes to eliminate cracking. After bending, the section may be joined by welding or by a gusset plate bolted or riveted to the bend.*

directions, the stretch press has become a very popular method of carrying out the work. Basically it consists of a hydraulic ram to which is attached a mold of the desired shape. Over this, the aluminum sheet is placed and clamped into fixed retaining jaws on either side of the ram bed.

When the sheet has been clamped in position, the ram head—which is also the template—is raised. The sheet is gradually stretched by the even pressure from below. The stretch will depend on the curvature required in both directions of the template. With aluminum there is often enough malleability to enable them to be pressed out by the spoon.

Pressure by means of the spoon is generally sufficient to remove a pucker at the start, but the operator should not hesitate to use the mallet if the pucker will not give way readily to the spoon. The template can be a block of concrete. This is a cheap and convenient way to produce a complicated shape. The finish of the work may be improved by placing a sheet of rubber or paper between the template and the work.

There are various forms of stretch presses available, ranging from small hand operated machines to very large sizes. Generally they are designed to be adjustable over a wide range of sizes of sheet and for a wide variety of different bends in both directions.

The forming of sheets into component curves often requires that surplus material be cut away before forming and the edges of the cut be brought together and welded up. By this means quite sharp bends in material already curved or bent in the other direction can be made. Sometimes these cuts are required at several points along the edge of the sheet, and occasionally in the center part of the sheet.

Where welding has been carried out, all sheet work after forming will require a certain amount of planishing to produce a fair surface. The normal method of carrying out this operation is by hammering and wheeling.

How to Anneal

In certain circumstances there may be a need for annealing of non-heat-treatable alloys to remove hardening introduced by cold work. This should only be attempted with full knowledge of the alloy and its condition and only under expert control. Workshop annealing of heat-treatable alloys is almost certain to impair their properties and should not be undertaken.

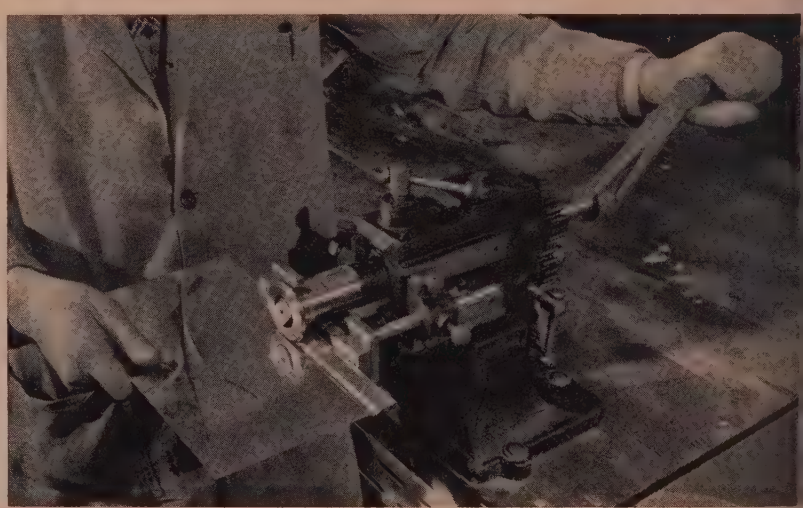
It must be remembered that aluminum is annealed at a comparatively low temperature (about 350°C) and shows no change in color or surface appearance at the annealing temperature.

The non-heat-treatable alloys can be annealed by careful heating with a blow pipe or similar means. The heat should be applied to as small an area as possible and as quickly as possible to reduce the spread of the effect.

The annealing temperature can be indicated by several well-tried workshop methods. First is the use of Tempilstik heat indicating crayons which are rubbed on the work and melt at the right temperature. If these are not available, a carpenter's blue crayon will turn white at approximately 350°C; this should be verified by experiment.

A film of soap applied to the work will turn black at approximately the right temperature, and a pine stick will leave a brown char mark if scraped along the surface. This last method will also indicate the approach of the annealing temperature by leaving an oily deposit at a slightly lower temperature.

The examples cited herein show that the working of aluminum is essentially similar to that of other common metals. In many respects it is one of the simplest metals to work and can be handled with the most elementary equipment. Obviously, the use of heavier tools will enable the work to be carried out faster, but such equipment is not essential, even for apparently complex forming operations.



■ *Fig. 7. A bench type beading and flanging machine being used to form a bead in aluminum sheet. Both rolls in this 2-roll machine are driven, and the lower one is adjustable outward so as to overlap the upper one for flanging.*

IMPORTANT DESIGN ADVANCES . . .

IMPROVED DOCKBOARDS NOW MADE BY LARGEST MAGNESIUM FABRICATOR IN U. S.

In June, 1958, Brooks & Perkins introduced a line of improved design magnesium dockboards. A pioneer fabricator of magnesium assemblies for military aircraft, missiles, electronics, and communications systems, the company is the largest fabricator of magnesium assemblies in the U. S.

B & P manufactured the Vanguard Earth Satellite, the tail cone for the B-47 Bomber, the gun turret enclosures for the mammoth B-36 Bomber, the vertical plotting equipment for Continental Air Defense, the new Lockheed Electra Propeller Spinners, jet pods, radar reflectors, aerial delivery platforms, Signal Corps teleprinter covers, and thousands of other assemblies used in aircraft and missiles.

Earth satellite's magnesium shell is typical of B & P's skill in fabrication.

B & P also operates the second largest magnesium rolling mill in the U. S. and supplies sheet and plate to hundreds of users; was the first producer in the world of Boral for

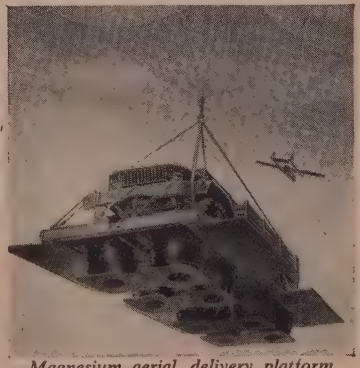
Magnesium tail cone and gun turret enclosure for B-47 Bomber.

neutron shielding; was the first company to hot, deep draw parts from titanium; and the first company to hot, deep draw zirconium sheet.

The company also makes magnesium photo-engravers metal and back-up plate for the newspaper and graphic art industry.

Brooks & Perkins and Calumet & Hecla jointly own the subsidiary

Kleinschmidt teleprinter on pack board and set up.



Magnesium aerial delivery platform developed and built by B & P.

Alabama Metallurgical Corp., now constructing a primary magnesium production plant in Selma, Alabama. When this is in production by August, Alabama Metallurgical Corp. will be the second U. S. commercial producer of magnesium.

B & P DOCKBOARDS GIVE EXTRA VALUE

Users of B & P dockboards are assured of extra values which result in stronger, safer dockboards with longer life.

The greatest dockboard improvement in years is the ***B & P one-piece extruded curb with forged ends.*** Other important extra values include: curbs with ***full length hand grips*** for safer, easier handling. Faster, safer movement of lift trucks over the boards is assured by ***yellow curb markings.***

All B & P boards are ***arc-welded with argon-shielded consumable electrode*** for better weld penetration and highest strength. Every dockboard is ***heat treated after welding for stress-relief*** to eliminate stress cracking in service.

These plus values and the fact that all B & P dockboards are strong, light magnesium made by the largest and one of the oldest magnesium fabricators in the country, guarantee extra value for every dollar spent.

B & P has for several years made magnesium hand trucks of superior design and workmanship; also other non-powered floor trucks of all types.

Write for B & P Dockboard Brochure.

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BROOKS & PERKINS INC.

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Distributor Broadens Its Market

Korhumel Takes on Kaiser Architectural Shapes; Plans Aggressive Sales Effort

BROADLY speaking, anybody selling products or services to the building industry can anticipate better business during 1959 than last year. New construction activity expanded seasonally in May to $4.6 billion, according to the Department of Commerce, bringing the total for the first five months of 1959 to $19.7 billion, or 13% above the same period last year.

Total valuation of residential nonfarm buildings for this five-month period ran 29% over last year, while additions and alterations in this segment of building tallied another 9%. The industrial building picture is considerably less rosy, though, with a 31% drop in total valuation as against last year. Commercial building has had only a 4% improvement.

In spite of these contradictions, the building and construction industry continues to be aluminum's biggest market, attracting new fabricating and manufacturing firms every year. Distributors too have been paying increased attention to the building field's potential.

As of mid-May, Korhumel steel & Aluminum Co., Evanston, Ill., joined the ranks of aluminum distributors who view the building and construction field as an increasingly important sales target, and therefore worthy of a more concentrated effort. Up to that time, Korhumel had not warehoused architectural shapes.

"It was pretty much out of our general line of business," explains William J. Kearney, vice president in charge of sales, "but it's our intention to aggressively pursue the architectural field from now on."

In immediate charge of this new activity is Joseph A. Garon, whose appointment as manager of Korhumel's architectural aluminum products sales was announced by Kearney. Garon comes to the distributor from Kaiser Aluminum's Chicago office, where he had served as assistant manager, product sales planning.

The Korhumel warehouses at 2424 Oakton St., Evanston, and 3225 S.E. Como Ave., Minneapolis, have taken on complete lines of Kaiser aluminum architectural shapes. These include gravel stops and copings in standard lengths up to 10 feet; as well as the accessories including welded mitered in side and outside corners, joint cover and cant strips; thresholds for exterio or interior installations in six differer sections up to 16 feet; eight extrude handrail shapes; and fittings.

Other products are angles, channel I- and H-beams, tees and zees in stand ard lengths to 25 feet.

"We now stock these architectura and structural shapes in standard size from the smallest to the largest, i architectural alloys with sharp corner for ornamental work, and in structura alloys for loadbearing jobs," Kearne explained.

Korhumel also has the complete lin of Kaiser extruded rod, bar, pipe an tube in lengths up to 21 feet; facin systems in 16-ft. lengths for interio and exterior applications, with all th necessary fittings; and two window si sections in 18 different sizes.

Of equal importance in Korhumel architectural sales plans are Kaiser "Diamond-Rib" corrugated roofing an siding sheet, and tread plate.

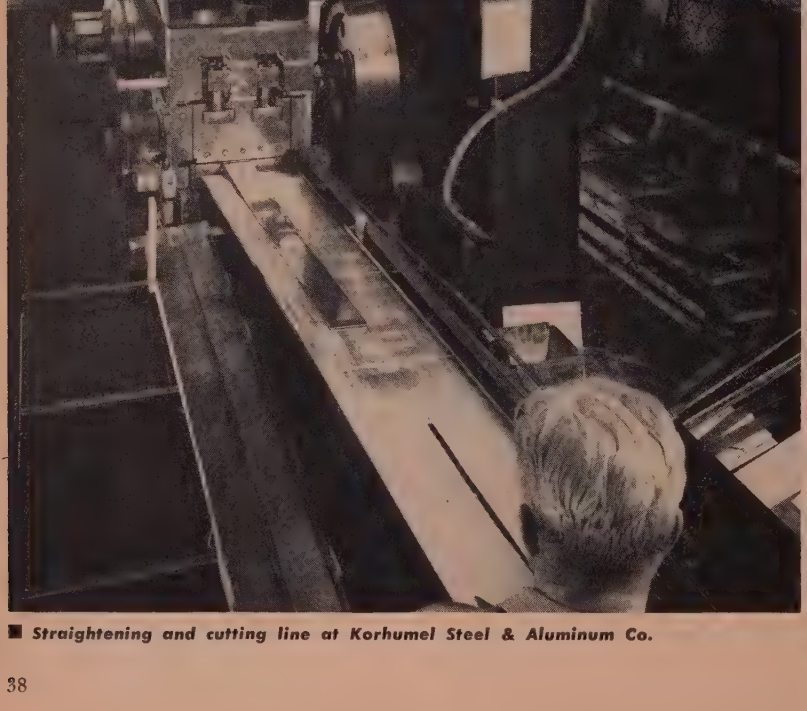
"Naturally, we don't look to Kaise for certain types of fittings and fa teners," Kearney said, "but we follo their recommendations in stocking th necessary aluminum and steel lines.

In store for Korhumel salesmen i the new experience of calling on arch tects and general contractors. In thi area Kearney is aware that a conside able amount of missionary work will b involved—reminding these prospects o Kaiser's capabilities as an aluminur producer. The ornamental iron shop will be given greater attention tha heretofore as outlets for the new line

"Our existing sales force will be abl to handle these additional calls," Kear ney said. "While I think that the ex trusions will probably be the big mov ers, this is a new experience for us an I might be surprised."

Kearney was also mindful that man of Korhumel's long-time customer would turn out to be users of some o his firm's architectural products.

With sales offices in 14 cities fron Detroit to Los Angeles, Korhumel Stee & Aluminum could make a good thin of the new architectural products sale venture. Building activity is on the up trend in most of these areas.



■ *Straightening and cutting line at Korhumel Steel & Aluminum Co.*

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7 GOOD QUESTIONS ABOUT ALUMINUM FORMING . . .

If you have a question about forming aluminum, the chances are your Kaiser Aluminum Distributor can answer it. Experience and metal know-how are as much his stock in trade as top quality aluminum. Use his fund of technical knowledge, backed up by the engineering ability of Kaiser Aluminum's field staff.

Here are the answers Kaiser Aluminum Distributors have given to specific questions about forming aluminum. If you don't see the answer to your questions here, ask *your* Kaiser Aluminum Distributor.

Q. How can I eliminate fractures in beads made in a closed die in the center of a large sheet of aluminum?

A. When beads are formed in the center of a large area no drawing in of the metal can take place; therefore, the limit is the elongation of the material. A flat bottom on the bead restricts elongation; hence, a rounded profile should ease the problem greatly.

Q. Can I bend 2024-T3 plate ¼" thick to a ¼" inside radius?

A. Any metal, or alloy, depends greatly upon the elongation of the material at the outside of the radius to produce a satisfactory bend. A measure of the length of the outside of the bend compared to the neutral axis would show that such a bend in ¼" 2024-T3 is not practical.

A better approach would be to use the recommended minimum bend radii in the following table, realizing, of course, that these radii recommendations are predicated on the use of good tooling.

APPROXIMATE RADII FOR 90° COLD BENDS OF ALUMINUM AND ALUMINUM ALLOY SHEET

(In Terms of Thickness)

These radii represent average values for forming on conventional equipment with tools of good design and condition. The minimum permissible radii are subject to several variables and can only be reliably determined by actual forming under the specific manufacturing conditions.

ALLOY AND TEMPER						SHEET THICKNESS T (INCHES)					
1100	3003	5005	5052	6061	2024	.016	.032	.064	.125	.187	.250
O	O	O	—	—	—	O	O	O	O	O	O
H-12	H-12	H-12	O	O	O	O	O	O	O	O-1T	O-1T
H-14	—	—	—	—	—	—	—	—	—	—	—
—	H-14	H-14	H-32	—	—	O	O	O	O-1T	O-1T	½-1½T
H-16	—	—	H-34	—	—	O	O	O-1T	½-1½T	1-2T	1½-3T
—	H-16	H-16	—	T-4	—	O-1T	O-1T	½-1½T	1-2T	1½-3T	2-4T
H-18	—	—	H-36	T-6	—	O-1T	½-1½T	1-2T	1½-3T	2-4T	2-4T
—	H-18	H-18	H-38	—	—	½-1½T	1-2T	1½-3T	2-4T	3-5T	4-6T
—	—	—	—	—	T-3	1½-3T	2-4T	3-5T	4-6T	4-6T	5-7T

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Chase Brass & Copper Co.
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Korhumel Steel & Aluminum Co.

NEWARK, NEW JERSEY
Chase Brass & Copper Co.

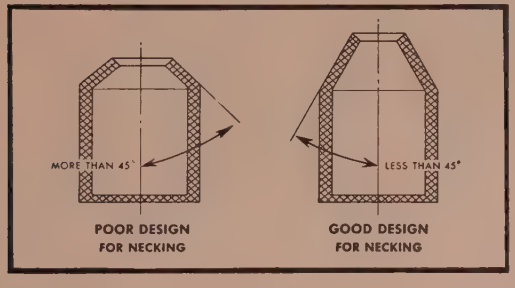
AND 7 GOOD ANSWERS BY KAISER ALUMINUM DISTRIBUTORS

Q. **Is tooling for aluminum the same as for steel products?**

A. Tools for aluminum must be of better quality than those normally used for steel products. Hardened steel should be used wherever possible in dies and on the tool surfaces that form aluminum. Cast iron tools are not recommended because of surface voids into which the aluminum can be forced, with probable "pick-up" and scratches resulting. A mirror finish on tool surfaces is recommended.

Q. **How can I prevent buckling in my roll forming of trim strip?**

A. This problem is one of basic tool design and requires the cumulative adding of .010 to .030 to each calculated diameter on each succeeding set of rolls in order to maintain sufficient tension on the strip.



Q. **How can I shrink the neck of a drawn sheet without buckling taking place?**

A. Reduce the angle between the neck and sidewall to something less than 45°. See drawing above.

Q. **Is it possible to anneal aluminum between forming operations?**

A. When aluminum has been cold-worked to the point that further work is not practical, it is then possible to partially anneal it before continuing the forming. With aluminum, annealing must be carefully controlled in order to assure adequate workability. It is suggested that we help you work out a fabrication procedure during your planning stage.

Q. **What lubricant would you recommend for light forming operations?**

A. For simple operations, where heavy pressures are not involved, there are a variety of soluble drawing compounds that can be used. Frequently dry cake paraffin is successful. Keep in mind that mineral oils do not have sufficient slip or lubricity where heavy pressures are necessary. Compounds of vegetable oils or tallows are required.

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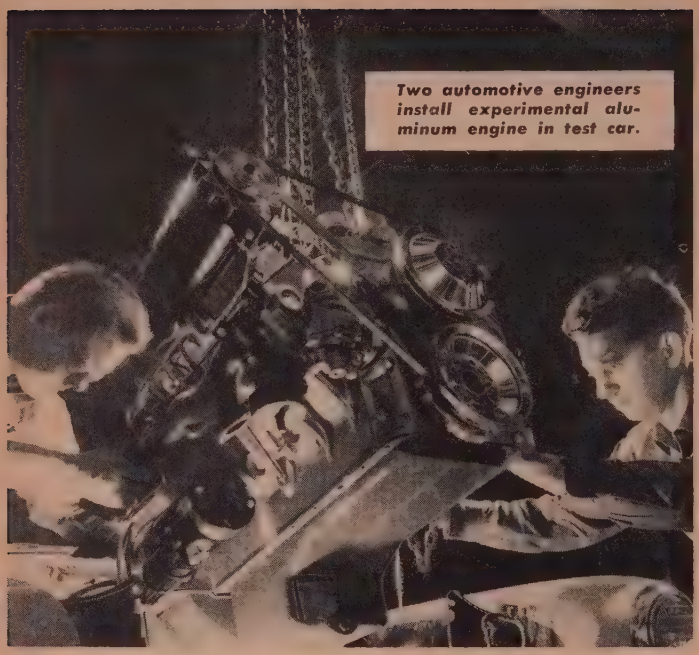
HIGH SILICON ALLOY BRIGHTENS ALUMINUM'S PROSPECTS FOR AUTO ENGINE CASTINGS



Two automotive engineers install experimental aluminum engine in test car.

Low coefficient of expansion, plus high hardness and wear resistance, make hypereutectic aluminum-silicon alloy a strong candidate for engine blocks, other automotive castings. Phosphorus refines silicon crystals.

by Oldrich Tichy, Chief Metallurgist, and Rolf Kissling, Metallurgist, Apex Smelting Co., Cleveland

RECENT talk about aluminum automobile engines has stimulated interest in the hypereutectic aluminum-silicon alloys. With their low coefficient of thermal expansion, high hardness, and excellent wear resistance, these alloys are considered strong candidates for such automotive applications as pistons, engine blocks and brakes.

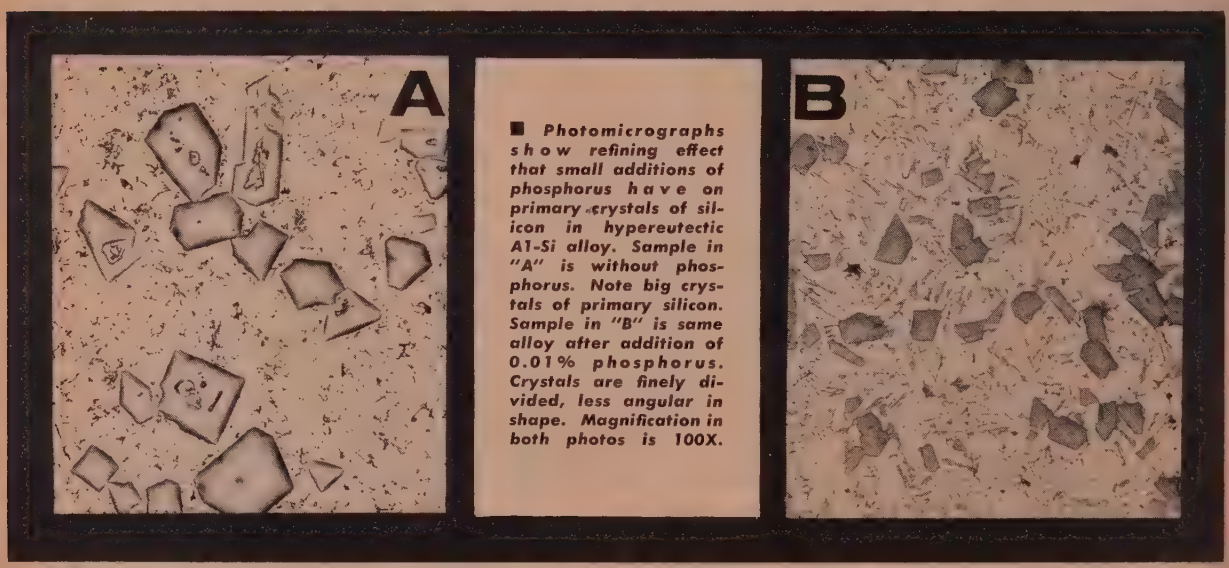
Other aluminum-silicon alloy systems —mostly of the eutectic and hypoeutectic types—have been under development since the early 1920's, but effective means of refining the primary silicon crystals in the hypereutectic system were not developed until the early 1950's. It was in this period that European research discovered that additions of phosphorus refined the hypereutectic silicon, thus improving the machinability of these alloys.

Enter Red X 20 Alloy

In the U. S., Apex Smelting Co. holds patents on, and has perfected, a hypereutectic aluminum-silicon alloy — Red X 20 — with the following nominal composition: Mg, 0.7%; Mn, 0.5%; Si, 21%; Cu, 1.6%; Ni, 0.4%, the balance, Al.

Heat treatability of this alloy is provided by magnesium and copper, manifested as magnesium silicide and Al-Cu-Mg compounds. Dynamic properties are improved by copper in solid solution, while high temperature strength is enhanced by manganese and nickel. Iron content is controlled by using a special high-grade, low-iron silicon developed by Apex.

The structure of Red X 20 is a complex, non-modified eutectic, interspersed with primary silicon crystals. Since the



■ *Photomicrographs show refining effect that small additions of phosphorus have on primary crystals of silicon in hypereutectic Al-Si alloy. Sample in "A" is without phosphorus. Note big crystals of primary silicon. Sample in "B" is same alloy after addition of 0.01% phosphorus. Crystals are finely divided, less angular in shape. Magnification in both photos is 100X.*

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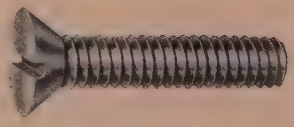

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TABLE I — MECHANICAL PROPERTIES AT ROOM TEMPERATURE*

(Average of 12 bars tested)

		Temper	Tensile Strength psi	Brinell Hardness HB
Sand Cast	—F	As Cast	21,700	76
	—T5	400°F for 8 Hours	22,600	90
Chill Cast	—F	As Cast	25,100	87
	—T5	400°F for 8 Hours	32,000	102
	—T7	960°F for 6 Hours— Hot Water Quench — 400° F for 8 Hours	38,200	110
Die Cast		As Cast	35,200	115

*Elongation: O — 1%

COMPOSITION — %

Mg	Mn	Si	Cu	Fe	Ni	P
0.77	0.58	20.30	1.66	0.65	0.37	0.01 (added)

liquidus is quite a bit higher than that of most commercial alloys, and since silicon's high latent heat tends to slow down solidification, grain refinement is necessary.

Refinement is accomplished with very small additions of phosphorus, which greatly increase the dispersion of silicon. Apparently, phosphorus not only acts as a nucleating agent, but also alters the crystal habit of primary silicon.

The photomicrographs in Fig. 1 illustrate this phenomenon. A hypereutectic 21% silicon alloy without phosphorus additions is shown in "A." Note the large crystals of primary silicon. With the addition of 0.01% phosphorus, however, these coarse crystals are divided into smaller, more rounded ones (shown in "B") without affecting the eutectic structure.

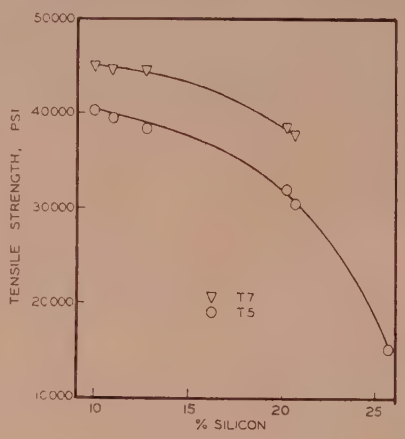
Sodium? No; Chlorine? Yes

This refining technique did not produce consistent results until it was found that the size of the phosphorus salts seems to play an important role, and that sodium tends to counteract the phosphorus effect. Thus, it is important to make certain that the alloy is not contaminated with sodium. In the foundry, for example, this could result from the use of sodium-containing fluxes.

Chlorine, however, is recommended for cleansing; it has no adverse effect on the phosphorus modification. Of particular value to the foundryman is the fact that the phosphorus modification carries over into remelts—as often as three of four times, in fact.

Aluminum-silicon alloys become more fluid with increasing silicon content. At 20% silicon, the rate of increase tapers off, however, and seems to reach

Fig. 2 — Effect of Silicon on Tensile Strength of Al-Si Alloy (chillcast)



its peak at around 21% silicon. Since the cooling curve shows a primary arrest at around 1280°F (which is unaffected by the phosphorus addition) the pouring temperature is higher than for most commercial alloys—1400-1450°F for sand and permanent mold castings, and 1300-1350°F for die castings. Since hot shortness is a function of the solidification interval, the hypereutectic alloys have a slight tendency to hot-short of the same order as the hypoeutectic alloys. Feeding characteristics are poor, due to the mushy condition resulting from the wide solidification interval.

Like other alloys with a wide solidification interval and a primary crystallization, the hypereutectic alloys are prone to some micro-shrinkage. Feeding distances, therefore, must be kept short, and wide but short risers should be used. Linear shrinkage is around 1.1% —smaller than that of most commercial aluminum alloys.

Silicon content has a strong influence on the mechanical properties of the hypereutectic Al-Si alloys (the decrease in tensile strength with increasing silicon content is shown in Fig. 2). The nominal composition of Red X 20 is a compromise between low coefficient of thermal expansion and high mechanical properties. For the intended applications, the expansion coefficient and wear resistance are of more importance than high mechanical properties. (Test results obtained with separately cast testbars of a commercial heat of the alloy are shown in Table I, along with the alloy composition.)

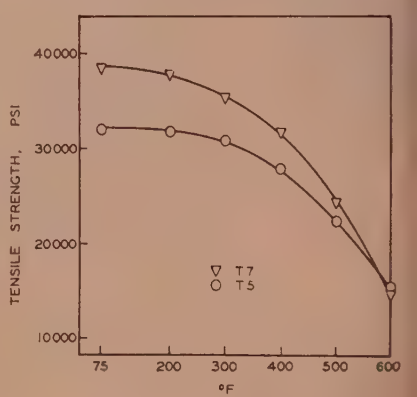
Response to Ageing

The slow cooling of sand castings causes hardening constituents to precipitate in relatively large particles. Only a small amount is retained in solid solution, so the response of mechanical properties to ageing is small. Permanent mold and die castings show a definite increase, however. Solution heat treatment followed by hot water quench and ageing gives further improvement.

The influence of temperature is small up to 400°F and at about 500° the strength of the hypereutectic alloy compares favorably with that of forged ASTM CN 42 A (27,500 psi) and chillcast ASTM SC 103A (23,000 psi). The testing of mechanical properties after one hour at temperature seems to be a fair measure of the effect of temperature (see Fig. 3). Longer times at temperatures have almost no further effect on these properties.

The thermal conductivity of aluminum — unlike that of ferrous alloys — rises with increasing temperature. Alloying elements which form solid solu-

Fig. 3 — Effect of Temperature on Tensile Strength of Al-Si Alloy. One Hour at Temperature (chillcast)



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tions with aluminum reduce its thermal conductivity. Silicon is only slightly soluble, however, and has no great effect on conductivity. Since the thermal conductivity of a solution heat treated matrix is noticeably lower because of the larger amounts of dissolved elements, a heterogenous (completely precipitated) structure is preferable from the conductivity standpoint.

A chillcast specimen has a higher conductivity than a sandcast one due to the finer, denser structure, and a modified alloy shows a slight advantage over the non-modified. But in the modified state, the casting method has very little effect on thermal conductivity.

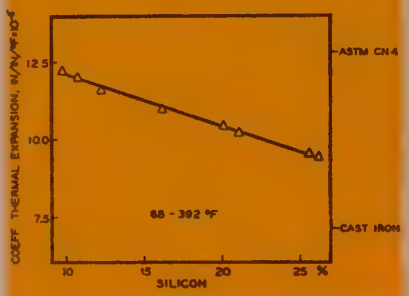
Having the lowest coefficient of thermal expansion of known aluminum alloys, the hypereutectic Al-Si alloys are ideal for pistons, cylinders, brake drums, etc. Among the common alloying elements, silicon has the strongest reducing effect on thermal expansion. The coefficients of thermal expansion of various aluminum-silicon alloys in the 68-392°F range are plotted as a function of silicon content in Fig. 4. The linear relationship is evident.

To Control Growth . . .

Aluminum alloys have slightly different densities depending on temper, and the corresponding dimensional variations are commonly called "growth." This growth is generally considered the result of precipitation of alloying constituents from a supersaturated solution such as produced by solution heat treatment and quenching. Hence, it should vary with the temperature of reheating in the same manner as the solid solubility of the alloying elements concerned.

The time to maximum growth is a logarithmic function of temperature, but does not coincide with the time needed for maximum hardness. At slightly elevated temperatures, growth

Fig. 4—Effect of Silicon on Coefficient of Thermal Expansion of Al-Si



proceeds so slowly as to be of no practical importance, while the upper limit of the reheating temperature is fixed by the necessity of getting a high combination of mechanical properties.

Since growth takes place later than hardening, maximum mechanical properties and complete freedom from growth cannot be obtained simultaneously. Heat treatment, therefore, is necessarily a compromise between ageing and a degrowthing treatment.

Dimensional changes are not always due to growth, however. Machining can release internal stresses that increase dimensions. An internal or service stress of 15,000 psi, for instance, produces a dimensional increase equivalent to the maximum growth of most commercial alloys. The same holds true for thermal expansion due to a temperature rise of only 100°F.

Best Heat Treatment

The hypereutectic Al-Si alloy mentioned in Table I exhibits a freedom from growth unique among piston alloys and other aluminum alloys of the copper-silicon type.

The permanent growth of Red X 20 is plotted against time-at-temperature (logarithmic scale) in Fig. 5. The effect of several heat treatments on tensile strength and growth is also shown. It can be seen that the peak values should be obtained with a simple ageing treatment of 12 hours at 350°F, while the common heat treatment of 8 hours at 400 or 450°F leads to a slight over-ageing.

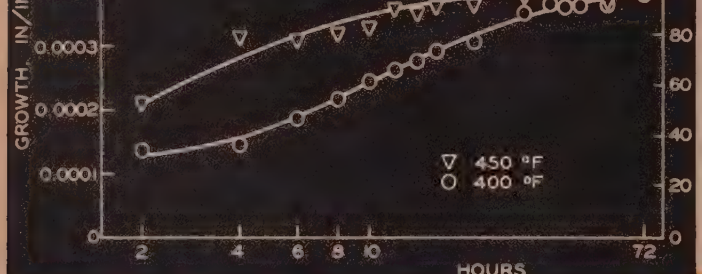
However, considerably more stress relief and degrowthing takes place at these higher temperatures. In many cases this is more important than a slight loss of properties.

With their low coefficient of thermal expansion and high wear resistance the hypereutectic aluminum-silicon alloys are especially well suited to applications such as pistons, brakes, and engine blocks. Their use in small gasoline engines started some time ago, and the results point to excellent possibilities for automobile engines. Early research and development work has led to sand, semi-permanent mold and die cast engine blocks with wet or dry aluminum or cast iron liners.

In Auto Applications . . .

The perfecting of the hypereutectic Al-Si alloys makes an all-aluminum engine look very attractive. With entire block cast in Red X 20, there would be no need for liners. Or a block cast in another aluminum alloy could be fitted with Red X 20 liners—either cast or extruded and forged. And by producing the pistons in the same alloy, the necessary clearances could be greatly reduced.

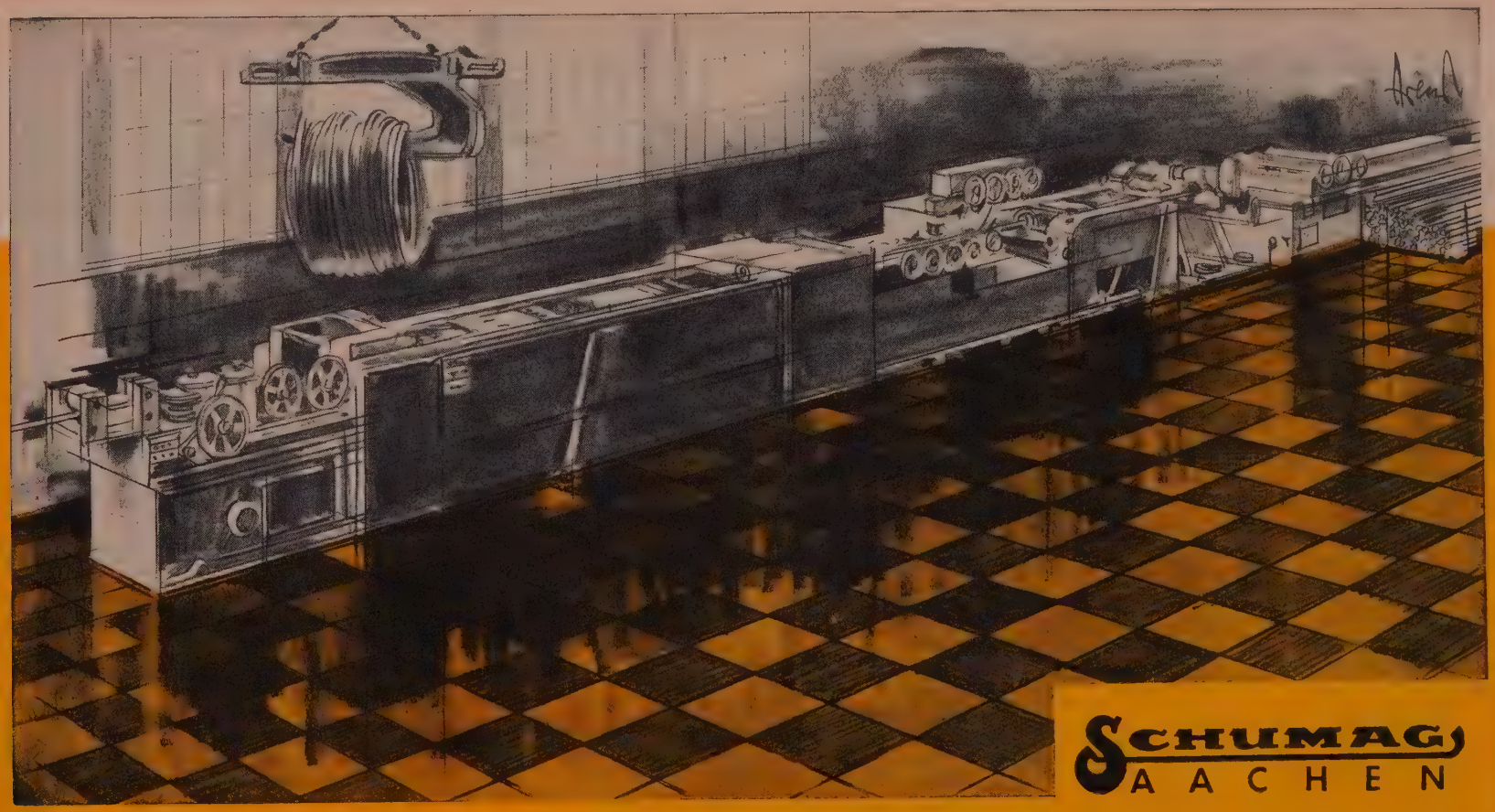
The early difficulties with valve seats —in aluminum heads for aircraft engines, for example—have been overcome in automotive blocks by the use of pressed-in seat rings made of special cast iron. Much work is underway between foundries and auto makers, and these efforts will undoubtedly lead to the wide use of aluminum and its alloys in automotive products.



Typical Values of Tensile Strength and Corresponding Removal of Growth

Treatment	Tensile psi	% Growth Removed
As Cast	26,000	
960°F/6 h—Hot Water Quench—		
300°F for 3 hours	35,000	
355°F for 12 hours	37,000	
400°F for 8 hours	38,000	
355°F for 12 hours	33,000	
400°F for 8 hours	30,000	55%
450°F for 8 hours	28,000	85%

■ ***Permanent growth of Red X 20 is plotted against time at temperature in graph; effect of heat treatments on properties and growth is shown in table. In many cases, removal of growth is more important than high physical properties.***



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what to look for in

ANODIZING EQUIPMENT

With more and more extruders and other aluminum fabricators installing their own anodizing departments, there is a need for information on what makes a good installation. In this article, an expert on the subject sets forth his opinions.

by Gilbert Tramer, President, The Gilbert Tramer Co., Cleveland

MORE and more aluminum extruders are doing their own anodizing. This trend to integrated extruding-anodizing plants is being stimulated by the development of automatic or semi-automatic anodizing installations tailored to the individual extruder's needs.

As a result, parts that were formerly sent to outside plants for finishing are now profitably anodized within the extruder's own plant. This eliminates extra handling operations, avoids delays, reduces handling costs, and gives the extruder better control over his production schedules.

Before an extruder, or any other aluminum processor, installs his own anodizing department, he should familiarize himself with the equipment required to apply this high quality decorative and protective finish to aluminum. There are three distinct types of anodizing operations:

1. The sulphuric acid process, with or without modifying chemicals.
2. Chromic acid process.
3. Hard anodizing process employing sulphuric acid plus oxalic acid, or sulphuric acid alone.

The usual cycle for the clear sulphuric acid process is a non-etch cleaner, rinse, pickle or desmutter, rinse, etch, rinse, anodize, rinse, another rinse, hot seal. Bright dips are used when a bright finish is required, either with or without the anodizing operation. Variations of this cycle can be employed for individual requirements to obtain the finish required.

Construction of Tanks

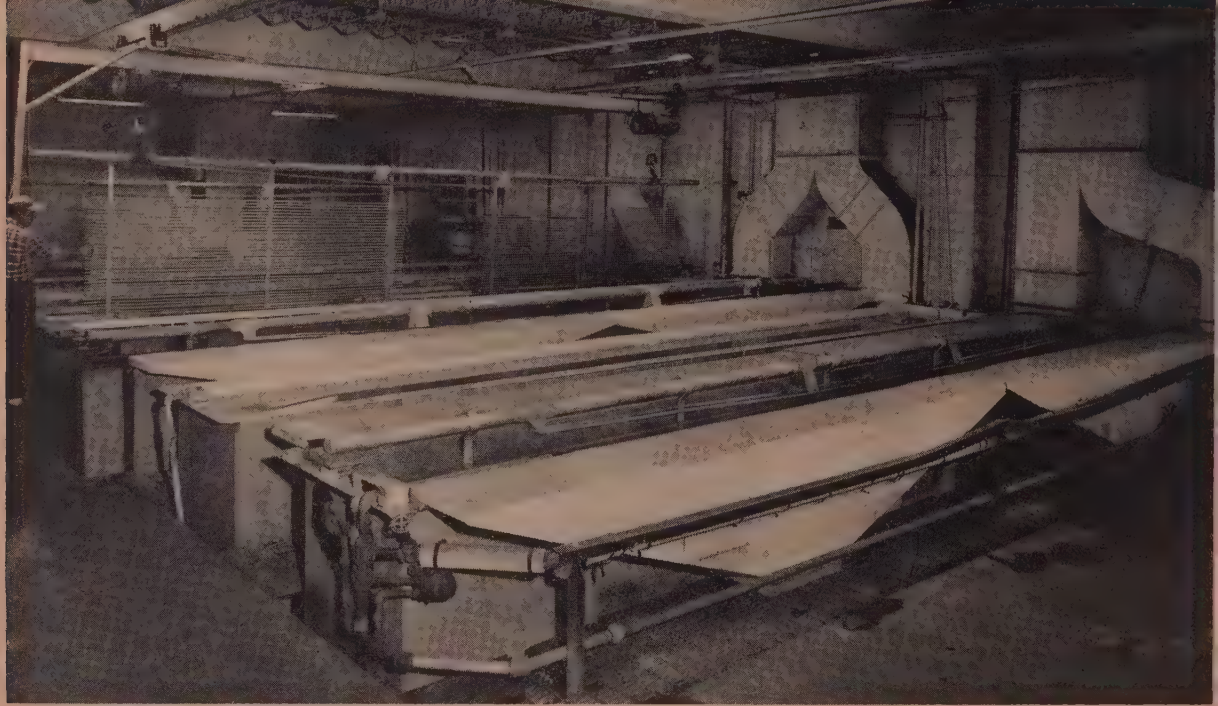
The alkali cleaner tank is usually constructed of mild steel, heated with a steam or hot water coil. Live steam is not recommended. Gas or electricity can also be used, but steam is preferable and less costly. A boiler having a pressure of 25 lbs. or more is recommended.

A pump outside of the tank is sometimes employed to give additional circulation which promotes faster and more uniform cleaning. Air is sometimes used to agitate the cleaner, but care must be taken to have the air oil-free. The tank should have a bottom outlet and a dam overflow. A temperature control with steel or stainless steel bulb and capillary should always be used to control temperature.

The rinse tank after the cleaner is usually steel, although glass-reinforced polyester may be used on smaller tanks. Rinse tanks should have a dam overflow for continuous overflowing, and a bottom outlet. Spray rinses may be mounted on headers placed on the side of the tank. These rinses are usually controlled by a valve which operates the spray when the work is entering or leaving the tank.

We have found that a perforated pipe placed on the bottom of the tank will both admit water to the tank and agitate the rinse water, thus facilitating rinsing.

The usual pickle is a chromic-sulphuric acid water solution operated at



■ *Complete anodizing department in a large extrusion plant. Anodizing tank is rubber lined; has sheet lead cathodes. Electric power (D.C.) is supplied by motor-generator set rated at 6000 amperes at 18 volts. Tanks are 27 feet long.*

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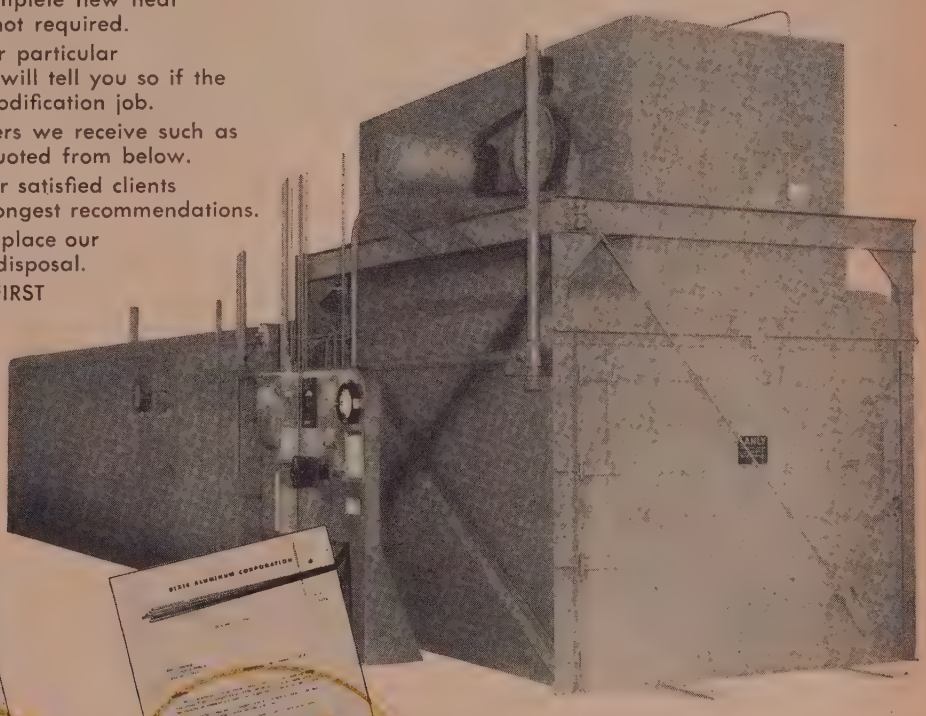
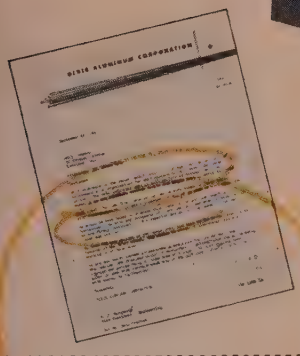


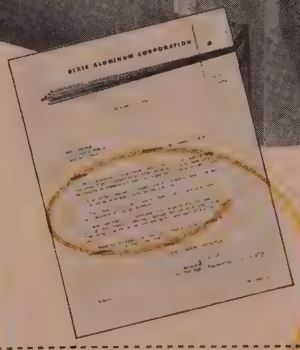
Modified Aluminum Extrusion Ageing Oven at Dixie Aluminum Corp. Width 5'6", Length 43', Height 5'6". 21,000 lbs. per charge. Temperature 350° F. attained in 1¾ hrs.



With reference to the recent modification of our age oven, we would like to commend your organization for what appears to be a very fine installation. The oven indicates that it will perform as desired, and the capacity is now somewhere between double and triple that formerly achieved.

Much credit for the fine installation can be attributed to Jerry Kramer, your representative. It was a pleasure for all of us here to work with him.

We would be very happy to discuss this installation and the benefits of horizontal flow with any prospects of yours that you may wish to refer to us. We are firmly convinced it is a superior design for the needs of our particular application.



With reference to your recent modification of our ageing oven from cross flow to longitudinal flow, we would like to take this opportunity to commend you and your organization on a job well done.

Your project was well planned, and a minimum of oven time was lost before we were again able to use the oven.

The installation itself has a compact, efficient look involving a minimum of piping, blowers, etc.

Most important, it functions in accordance with our specifications, the output of the unit through the use of a longitudinal flow being from two to two and one-half times that of a cross flow oven.

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■ *Hard coat anodizing installation calls for special equipment. Anodizing tank is usually lead-lined. Agitation of solution is extremely important; should be done by mechanical unit as shown here. Cooling of anodizing solution is also very important; a refrigeration company should be consulted for advice on proper cooling equipment.*

about 150° F. This requires a lead-lined steel tank, and a temperature control with lead jacketed bulb and capillary. Lead coils are used to heat the solution.

A nitric acid pickle or a desmutter is sometimes used instead of the chromic-sulphuric solution. This is usually operated at room temperature, and the tank should be constructed of stainless steel type 316 or 304 ELC. Tank reinforcements should also be of stainless steel. Clad stainless is not suggested because the nitric will attack the steel backing and eventually ruin the tank.

The rinse after the pickle should be a steel tank lined with an acid resistant material such as poly-vinyl-chloride (PVC) sheet or sprayed and baked epoxy. Stainless steel can be used for the rinse tank, which should also have a dam overflow and bottom outlet. The perforated water pipe on the bottom of the tank should be constructed of PVC. We recently tried sprayed neoprene for the lining of the rinse tank after the sulphuric acid pickle and it seemed to work quite well. This lining is easy to maintain and the initial cost is quite low.

The etch tank is usually constructed the same as the non-etch alkali cleaner tank.

When Bright Dipping . . .

If a bright dip operation is required, the tank is usually constructed of type 316 or 347 stainless steel. The tank should be heated with type 316 coils, and all reinforcements should be made of stainless.

The tank should be agitated by a mechanical mixer, either motor or air driven, in order to prevent striation of the solution and to produce a more uniform bright dip. The shaft and propellor of the mixer should be constructed of type 316 stainless and the motor protected from chemicals. A totally enclosed motor is preferable.

All the rinses after the bright dip tank should be lined with PVC or constructed of stainless steel, solid or clad.

In order to prevent dragout from the bright dip or any other acid tank from attacking the sides of the steel tank or steel grating, inverted V shields should be placed between the tanks. Such shields should be constructed of a material resistant to the individual acid solution.

The anodizing tank is usually constructed of steel, lined with either lead or rubber. The lead-lined type uses the tank as a cathode. The sides and bottom of the tank should be insulated in order to prevent short-circuiting if the work comes in contact with the tank. We find that a number 9 expanded steel grid coated with plasticol and then placed on the sides and bottom of the tank acts as an exceptionally good insulator for this purpose. The tank should have a lead or PVC perforated air pipe on the bottom for agitating the solution.

On full-automatic installations, current is conducted by a movable anode with copper V-blocks, or having the individual rack holding arm contact a flat bus bar while it is moving through the solution. On hand operated units employing individual racks, the work can be placed on a stationary copper anode placed on the tank.

When connecting the lead-lined tank into the cathodic circuit, the bus bar is connected directly to the lead lining—preferably on the rim reinforcing of the tank. It is important to make sure that the copper cathode bus bar covers at least half the length of the tank, either continuously or staggered in order to distribute the current uniformly throughout the tank. This is preferably done on both lengths of the supporting rim on the sides of the tank.

The open bus should be covered with a glyptol resin, or wrapped with insulating acid-resistant tape in order to prevent chemical attack upon the bus.

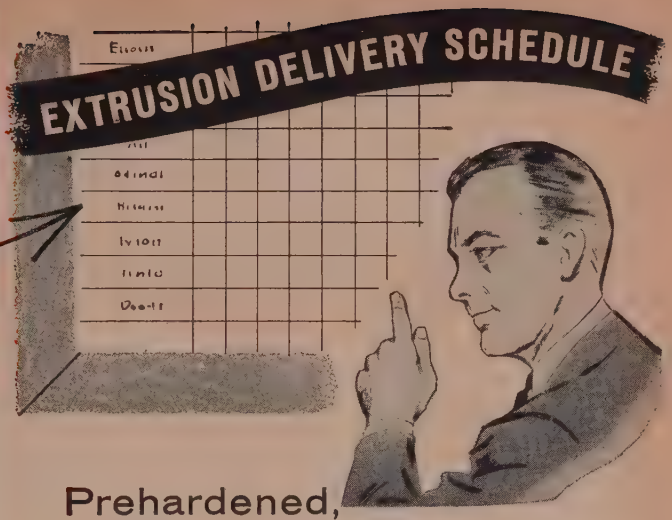
When using a rubber-lined anodizing tank, sheet lead may be hung from the sides of the stationary cathode to conduct current into the tank. When a controlled cathode-to-anode ratio is required, this method is sometimes preferable to the lead-lined tank as it is easily controlled by either adding or removing the sheet lead cathodes. A lead or PVC perforated pipe mounted on the bottom is used for agitating the solution.

When the tank is small, say 10 feet or shorter, a polyester tank may be used in the same manner as a rubber-lined steel one. Stainless steel anodizing tanks have been suggested, but as yet they have not been universally approved.

To Keep It Cool . . .

For cooling the solution a package chiller produces chilled water which is circulated through an exchanger consisting of carbon tubes in a steel tube or jacket. The exchanger can be of the bundle or individual tube type. The solution is circulated through the carbon tubes by means of an acid resistant pump, and the chilled water is circu-

VISCOUNT 44 pays off here!



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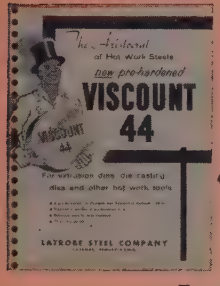

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Sectional views of rectangular billet, butt and finished extrusion photographed at the Fruehauf plant.

A production first at Fruehauf Trailer Company!

Rectangular billets extruded on a continuous-production basis

At the modern Fruehauf Trailer plant in Decatur, Alabama, rectangular-billet, high-strength, structural alloy extrusion is a reality. Since its installation in 1957, the Farrel Watson-Stillman 2200-ton press, shown above, has been in continuous production—without alterations or experimentation. As far as is known, this is the first press successfully to produce large extrusions from rectangular billets on a continuous-production basis.

The advantage of rectangular extrusion is that larger sections can be produced on a much smaller press than is required under conventional extrusion methods. At Fruehauf, the 2200-ton press is extruding 12" wide sections from 4" x 14" x 30" rectangular aluminum billets. The sections are used as structural parts for trailers.

Also at this plant, are two other Farrel Watson-Stillman machines—another 2200-ton press and a 1400-ton model, both used for conventional extrusion of smaller aluminum sections. The two 2200-ton machines are unique in that their tools are completely interchangeable. A detwisting-type hydraulic stretcher was supplied for each of the presses. Stretcher capacities are 100, 60 and 25 tons.

Send for more information about Farrel Watson-Stillman aluminum extrusion presses—for either rectangular-billet or conventional extrusion.

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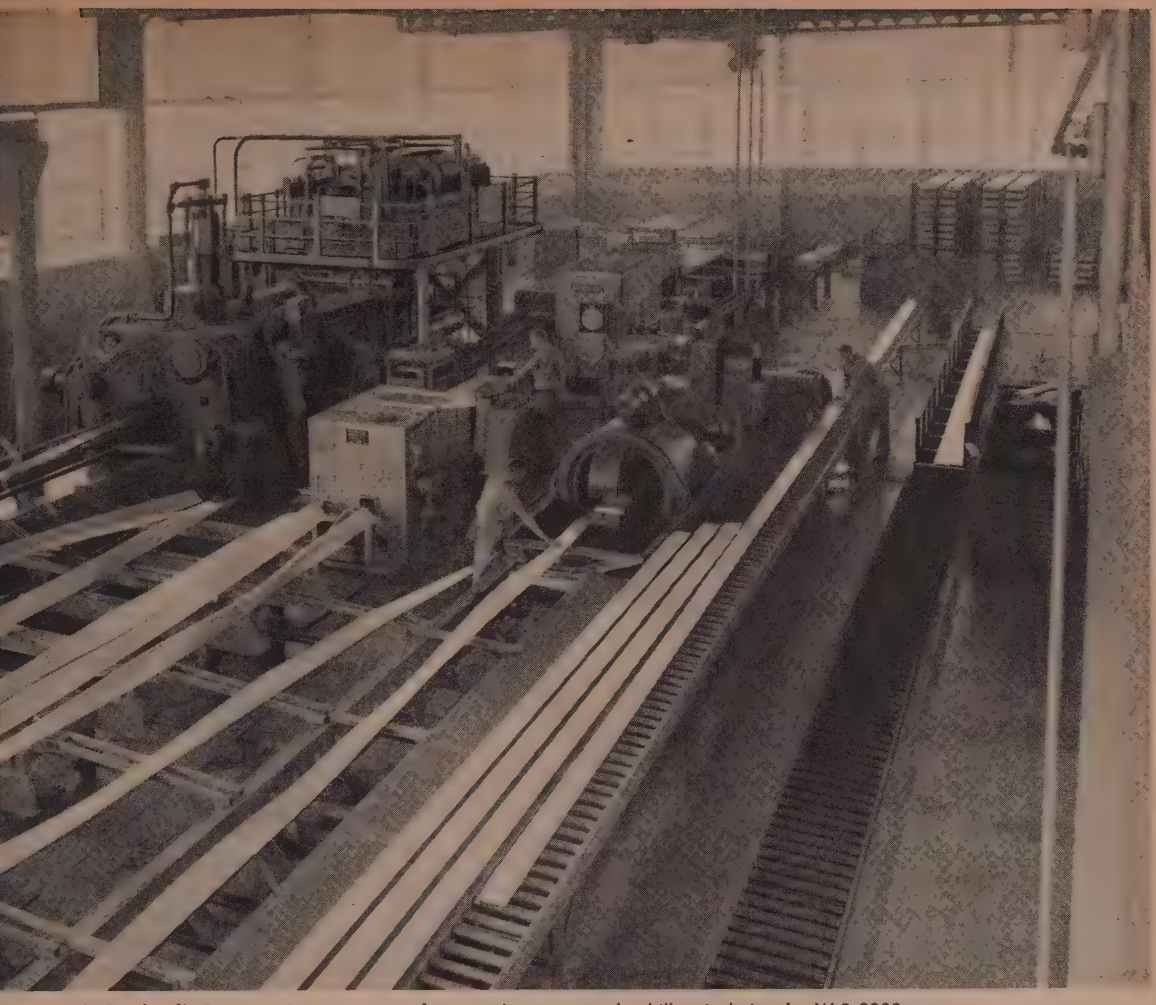

At Fruehauf's Decatur plant, the setup for extruding rectangular billets includes the W-S 2200-ton press and W-S 100-ton detwisting-type stretcher.

4" x 30" rectangular billet ready for extrusion Farrel Watson-Stillman 2200-ton press.

Close-up of rectangular sections being stretched-straightened on the Farrel Watson-Stillman 100-ton detwisting-type hydraulic stretcher.

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lated through the steel pipe surrounding the carbon tubes.

This unit should be hooked up with a controller to maintain the correct operating temperature for the anodizing solution. A lead cooling coil can be used instead of the exchanger.

24-Volt Rectifier Best

The rectifier unit for anodizing should either be 18 or 24 volts. The latter is preferable. The rectifier should have automatic current and automatic voltage control, and should have a timer for shutting the current off automatically after the anodizing cycle has elapsed.

A motor generator set can also be used as the source of current.

The rinse tank after anodizing should be a lined tank in the same manner as the rinse after the pickle, and constructed in the same manner. It is preferable to have two rinses after anodizing; the second rinse may be a plain steel tank, constructed in the same manner as other rinse tanks discussed.

The hot rinse and seal tank should be built of stainless steel, type 314 or 316, and the heating coil should be of 316 stainless. A temperature control with stainless steel bulb and capillary should be used to control the temperature.

When the work to be dyed is recessed, a bicarbonate rinse is required in order to neutralize the acid dragout from contaminating the dye tank. This is done in a tank constructed of mild steel.

Deionized water is sometimes required for the rinse, hot seal and dye tanks. For this purpose a single or two or four bed system should be used, depending on the degree of purity required and the hardness of the water.

If the work is to be dyed after anodizing it should not be sealed in the hot water seal. Some people prefer to give the work a nitric acid dip before the dye dip in order to remove any smut. The nitric acid tank is constructed in the same manner as the nitric acid tanks previously described.

The dye tanks are usually made of stainless steel, type 316 or 347. Dye tanks should have a stainless steel heating coil and a temperature control with stainless steel bulb and capillary. Mechanical agitation should be done by a motor or air driven mixer. Air agitation may be used but extreme care should be used to have the air oil-free so that the dye tank won't become contaminated. Reinforced polyester tanks may be used if the dye tanks are small.

Rinses after the dye tank are usually made in steel tanks similar to rinse tanks previously described. It is best to have two rinse tanks after each dye.

The seal solution used after the dye usually contains a small amount o nickel acetate. The tank is constructed of stainless steel — type 316 or 347 — o stainless clad. Heating coils are also constructed of stainless, and a stainless steel filter which can be packed with activated carbon should be used. This will remove all traces of dyes and enable the steel tank to be used on all colors.

All steel tanks should be painted with acid resistant paint, and should be placed on painted I-beams or channels — never resting directly on the floor. This will give the tanks a chance to "breathe," thus prevent rusting on the bottom.

The tanks used on the precleaning cycle for chromic acid anodizing are identical to those used for the sulphuric acid process. If sand castings are being anodized, it is sometimes best to use a nitric - hydrofluoric acid pickle. This should be used in a steel tank lined with PVC.

The chromic acid anodizing tank is made of steel, with steel heating and cooling coils. The usual temperature is 90°, plus or minus 5°. Heating and cooling should be thermostatically controlled, and air agitation is recommended. The tank is used as a cathode and is connected in the same manner as the sulphuric acid tank. Insulating grids coated with plastisol should be used to prevent any shorting of the DC power.

If the work is dyed, the same type of equiment is used as for sulphuric acid anodizing.

The DC power is supplied by either a rectifier or a motor generator set, and must be able to produce a minimum of 40 volts. The voltage is impressed over a period of 0 voltage to maximum voltage in approximately 5 minutes. This should be done automatically. Rapid raising to 40 volts may injure the power source. An automatic timer may be used to shut off the current after the anodizing cycle is complete.

For Hard Anodizing . . .

For the hard anodizing process, precleaning equipment is the same as discussed for the sulphuric acid method. The anodizing tank is usually lead-lined steel. Cooling of the tank is extremely important, and a refrigeration company should be consulted for this requirement.

Agitation of the solution is of great importance and this is best done by a mechanical unit, either motor or air driven. Air agitation is not suggested as the air is usually of a higher temperature than the solution. The use of air makes it difficult to control the low temperature used. Work rod agitation is also suggested. No seal is usually used when employing this process.

A 63S Alloy aluminum extrusion, actual size, extruded on a 14-mandrel die. Samples of this extrusion on request

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THIS tower, built in England from standard aluminum alloy staging sections, demonstrates the possibilities of this construction for permanent or demountable towers to support antennae for radar or micro-wave systems.

The 103-foot 'Zip-Up' stairway tower consists of a series of interchangeable folding sections which, when opened out, form rigid box frames each incorporating its own stairway section. These 100-pound frames are automatically held square and secure by the diagonal stairway and by braces which are provided with patented snap-on hooks.

Successive sections are interlocked one on top of the other by spigots which register in the tops and bottoms of the vertical corner tubes. After the 18-ft. level is reached, the pre-assembled sections are hoisted up by a davit which is hooked to the top of the tower and moved up progressively.

Construction of the sections, which are manufactured by Access Equipment Ltd., Maylands Ave., Hemel Hempstead, Hertfordshire, under license from Upright Scaffold Inc., Berkeley 10, Calif., relies upon the close tolerance of extruded aluminum round tubing in various sizes supplied by Northern Aluminium Co. Ltd., and cast aluminum-alloy couplings which incorporate a special locking device. Every corner and tubular connection is made with four welds.

Light weight of the structure eliminates need for elaborate reinforced concrete foundations and allows use of simple footings. The ease with which the sections can be handled makes for rapid erection, even by inexperienced personnel, and a minimum of labor is required on site.

For example, in one recent application, the erection and guying of a 204-ft.-high tower was completed by a team of eight men in only four hours. The system is ideal for towers where high-speed erection is necessary for emergency communications, or where towers have to be moved from site to site.

Transportation costs are also reduced; a complete 204-ft. tower can be packed in one two-ton vehicle, for when folded each section is only 6½ inches thick.

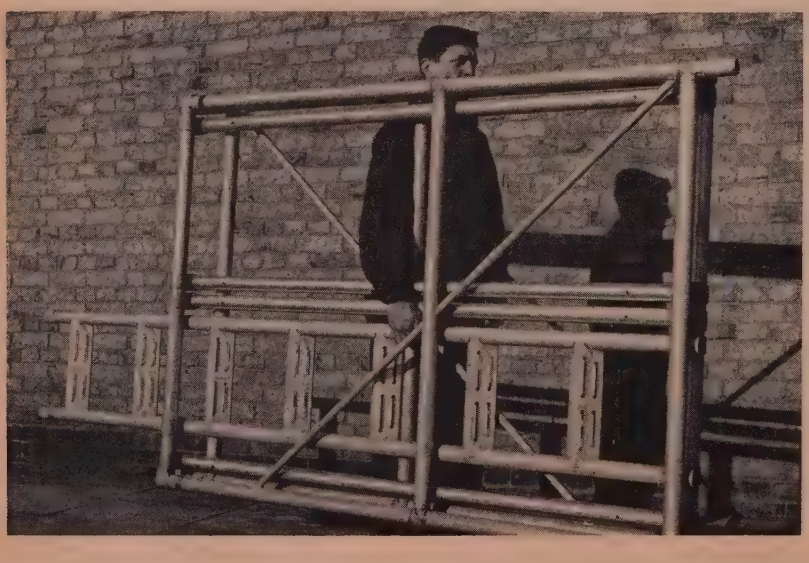
Noral reports that the tower staging system has been thoroughly tested both in the laboratory and in the field.

"It makes the most of the many advantages that aluminum has to offer," the firm said: "high strength/weight ratio; durability, even in severe atmospheric conditions; high resistance to mechanical damage; and reduced maintenance costs since no protective painting is necessary."

Erection equipment is kept to a minimum, and includes a guy winch, a 35-pound davit with a lifting capacity of 150 pounds, a tensiometer for uniform guying, and hoisting crane for heavy antennae. Other accessories include antennae supports and antennae tracks.

Four 'Zip-Up' stairway towers, one 204 feet and three 120 feet high, will form part of the radio tower and equipment for the recently announced mobile micro-wave telephone and telegraph communications system which is to link many of the U.S.A.F. bases in the United Kingdom.

■ *Made mostly of welded aluminum tubing, each "Zip-Up" tower section is easily carried by one man. Two-ton truck can haul sections for 104-foot tower.*



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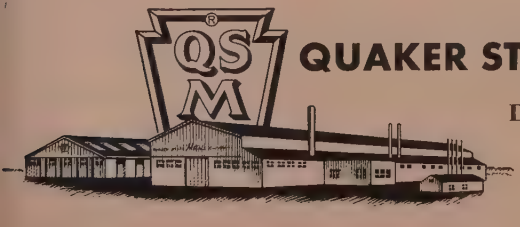

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by David G. Osterer, Vice President,
New Rochelle Tool Corp., New Rochelle, N. Y.

HIGH frequency electric resistance heating, applied to a new welding device, is revolutionizing the tube manufacturing industry. Installed in a standard tube mill, the Thermatool can weld any ferrous or nonferrous metal at rates in excess of 250 feet a minute.

Thin wall tubing, with wall thicknesses comparable to those of aluminum or tin plated steel cans, is being produced at better than a thousand feet a minute. The machine was developed and is being built by New Rochelle Tool Corp., New Rochelle, N. Y.

The Thermatool method represents the most efficient utilization of electrical energy for the production of welded seam tubing. In order to obtain this result, the electrical energy, with its subsequent conversion to heat, must be concentrated solely on the shallow interfaces of the strip being formed into tubing. The process is unique in achieving this requirement.

Elementary Requirements

The basic requirements for tube welding are extremely elementary:

1. The edges of the metal strip to be bonded together must be accurately positioned opposite each other as the strip travels through the mill.

2. The interfaces of the metal going to make up the seam must be heated to permit the metal to fuse when transverse pressure is applied.

3. Sufficient transverse pressure must be applied to form a homogeneous bond between the interfaces.

The first and last requirements are mechanical and have already been attained in tube mills. The second feature, involving the heating of the weld section, is the salient point in the Thermatool method. For optimum results, the heat energy should be confined solely to the weld area in order to minimize annealing adjacent to the weld.

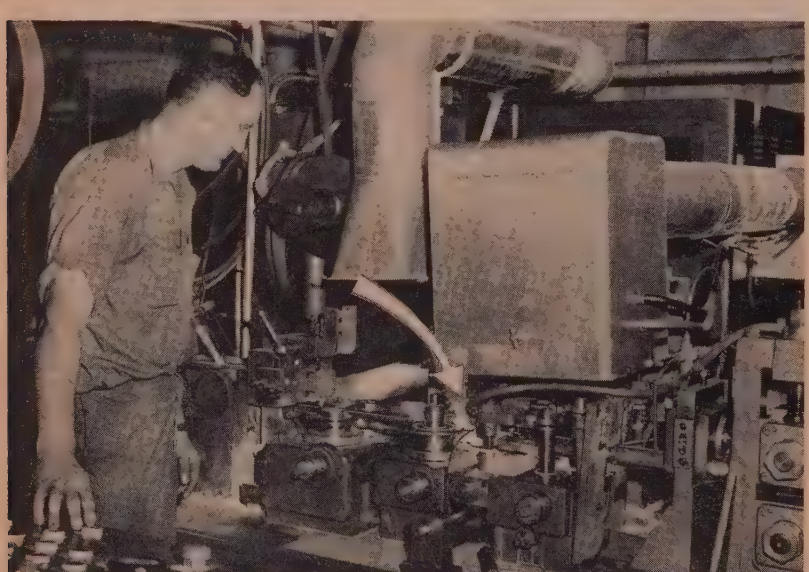
Concentration of the heat also reduces the amount of metal deformed, while the energy requirements for a given weld speed are reduced proportionately. Thus, the speed of the welding can be increased many times for a given energy consumption.

New Rochelle Tool Corp. pioneered the application of the "proximity effect" to industrial heating processes. The "proximity effect" causes the current to flow in that part of the electrical circuit which is in closest proximity to the return circuit.

For example, two bus bars carrying the current of a high frequency circuit would have the current concentrated on the inner faces, regardless of the width of the bars.

This principle lent itself admirably to the solution of the heating problem in tube welding, and is the basis of the Thermatool method. The tubing has two contacts riding on the surface of the strip stock prior to its entrance into the closing rolls on the mill. These contacts are connected to the output terminals of the high frequency transformer, which, in turn, is energized from the specially designed generator.

High frequency current flows out of one of these contacts and back through the other one. The path of current flow between the contacts is dictated by the "proximity effect," and concentrates on



■ *Directly under the encased Thermatool welding head can be seen a small flame (arrow) where the squeeze rolls are effecting a continuous forged weld in the production of tubing. Note convenient control panel.*

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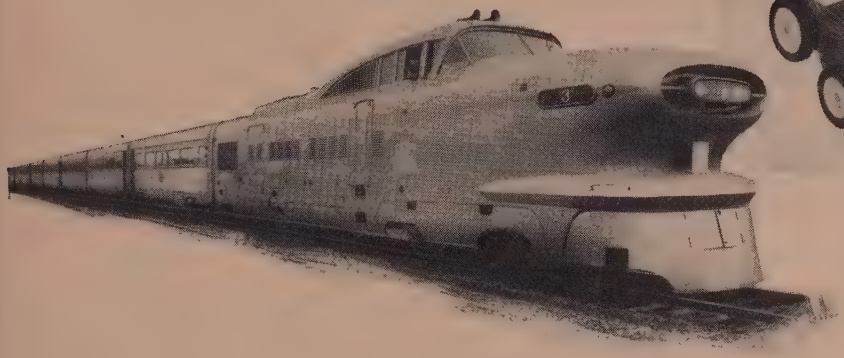

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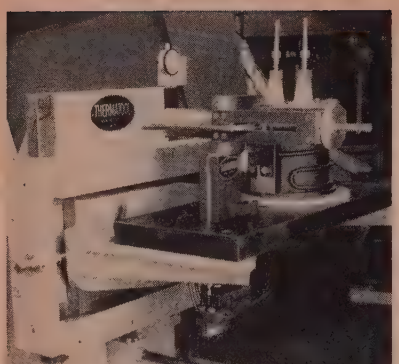


■ *This is the Thermatool welder. Shown at the top are the two leads to the output transformer. At the right of the transformer is the micro adjustment for power input. At the left of the black base under the transformer, and under the platform, are the two leads which connect with the two copper contacts that introduce high frequency current into the metal.*

the faces of the strip, crossing over at the weld point. The high frequency contact problem, considered insurmountable by many in the tube welding field, was solved by New Rochelle Tool engineers. As a result, this tube method was perfected and patented.

The welding head is now operating successfully for over 40 companies in this country and in France, Switzerland, Italy, Germany and Japan. Many more are on order. The users include the Aluminum Co. of Canada, Ltd. in their Kingston, Ont. plant; the Republic Steel Corp.'s Steel and Tube Division in Cleveland; Reynolds Metals Co.; James Steel and Tube Co.; and the J.F.D. Manufacturing Co., Brooklyn, N. Y.

Before tubing produced by the Thermatool method was made available in quantity, many users insisted on seamless tubing. Now this welded tubing is supplanting extruded tubing due to its quality and economy.

The Cost: Under $50,000

Seamless tubing produced by extrusion or drawing methods must carry the amortization of a high-cost plant, plus the heavy expense of operation and maintenance. High original cost and heavy operational expenses are eliminated by the New Rochelle tool. This welding head costs under $50,000 and the installation expenses are negligible.

Republic Steel recently completed two years' research with the Thermatool. The tubing put through rigorous tests had an outside diameter of one to three inches and wall thickness of .050 to .100 inches. Republic's market covers tubing for use in boilers, conduit, line and pipe casing, and mechanical uses.

The Aluminum Co. of Canada is now using the Thermatool to produce aluminum irrigation and compressed air tubing with diameters up to six inches.

This new process has other advantages in that no current flows around the tube or in adjacent sections, as in induction welding. Consequently, there is no wasted heat. This same restriction of heat also reduces the flash which later must be removed by scarfing.

Another outstanding feature is that this method is completely independent of the diameter of the tubing being processed. For a given wall thickness, the largest diameter tubing can be run as rapidly as the smallest. The rate at which stock can be welded for a given power input depends solely on the wall thickness of the stock; in fact, there is no requirement that the stock be a single strip and the method is finding application in edge forming two strips of metal.

The increased effective resistance of the metal realized by using high frequency current—approaching a half million cycles per second—permits greatly increased welding speeds on metal already being resistance welded into tubing. It also permits the welding of metal previously considered impossible to resistance weld.

In fact, 100% conductivity copper is welded with the same facility as other metals. Installation on tube mills formerly utilizing other welding methods has greatly increased production.

Fast Alloy Changeover

A salient feature of this method is in the changeover from one metal to another. At an early demonstration of the process, set up for 2-in. O.D. by 0.037-in. wall tubing, coils of various aluminum alloys, hot rolled steel, cold rolled steel, stainless steel, brass, and copper were run with only slight adjustment of the electrical controls because of changes in stock.

This welding method can be adapted to any tube mill. The welding head and associated transformer can be installed in a space from 24 to 36 inches in length between the last set of forming mills and the closing rolls. Conversion of mills already equipped with welding apparatus is extremely simple.

Installation on cold forming mills for butt seam or locked joint tubing presents no major conversion problem. The method can be applied to square, rectangular or other odd shapes.

Welding by this method creates only a small inside bead, much smaller than ever before. There is practically no inside spatter, usually caused by current fluctuations, hence very little rejection due to an almost consistently clean inside surface. Reprocessing delays a practically nil.

There is seldom excess flash due the fact that the bead is so small. T inner or outer bead, or both, can scarfed without reducing speed.

The heat-affected zone is very narr and this improves bending and flatte ing characteristics. Fabricators who be or form tubing do not need to positi the welded area.

If a customer were to buy a 50 k unit capable of welding a wall thickn of 0.167-in., addition of certain equi ment makes possible the welding larger gauge material and does not re der obsolete the purchaser's origin equipment. Tubing metal up to a ha inch thick can be successfully welde

This high frequency resistance weld is economical in other ways. It is co pact in its application to a formi mill. The high frequency generator a transformer take up a floor space only about three by seven feet, a the seven feet in height permits instal tion in any plant.

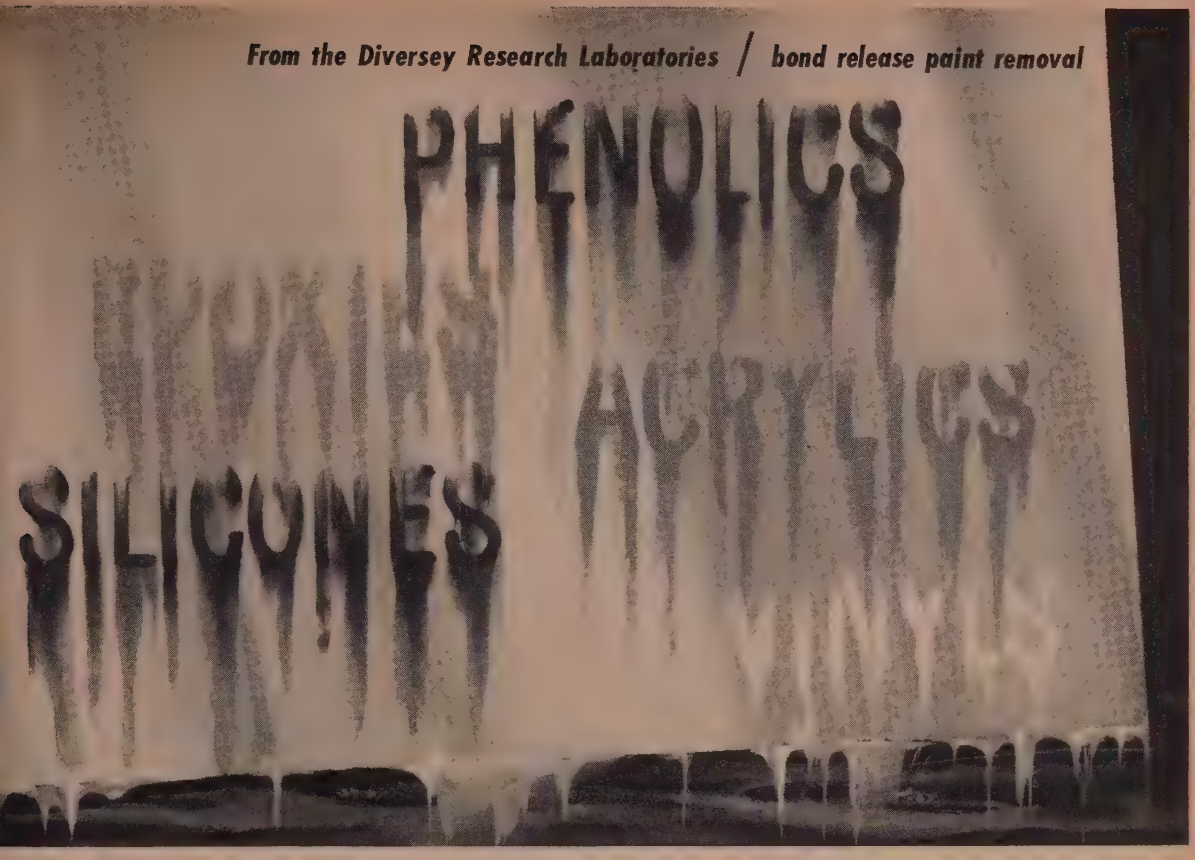
For Antennas, Furniture

A typical example of an installati where space is vital is the J.F.D. Man facturing Co. in Brooklyn, New Yo This company, in addition to man facturing small parts for radio and te vision companies, entered into the fie of TV antennas. They are current using 2 million pounds of aluminu tubing annually and have included al minum furniture in their line.

Their problem was the storage large quantities of various sized tubin The warehousing problem and the ma ter of keeping the supply of numero diameters of tubing constant was a m jor problem.

J.F.D. installed a Thermatool weld

■ *Spiral tube mill is a new developme of New Rochelle Tool Corp., utilizing i patented Thermatool unit. High rigidi of thin walled tube can be gained by i creasing the number of spirals per fo of tube produced.*



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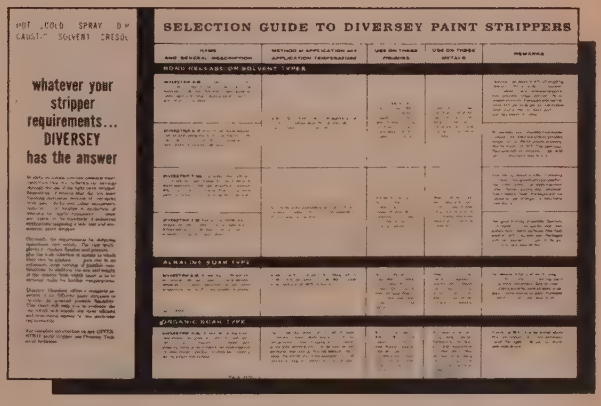

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and now they make their own tubing from 2000-foot rolls of strip which take up a comparatively small space. Since the Thermatool is interchangeable for various size tubing, they work with the production line across the street and by adjusting the forming mill, which takes just a few minutes, they can produce their tubing as desired and of the desired size. In the first year of operation J.F.D. saved 23% on the cost of tubing.

It's Mighty Flexible

Another phase of high frequency welding by the Thermatool method is the welding of strip to strip in a flat form. Still another is the welding of different metals, as for instance, in the manufacture of saws. The teeth of the saw demand a high speed steel which in today's market costs approximately $3.80 per pound. It is easy with this process to make perhaps 20% of the saw blade of high speed steel and the balance of low-grade steel costing 35 cents a pound.

Still another phase of this method of welding is the joining of a fin to tubing at high speeds.

A later development of New Rochelle Tool Co. has been the spiral tube welder which incorporates a Thermatool unit. The mill is compact, taking up approximately six by eight feet, a decided economy when it is considered that standard tube forming mills are 40 or more feet long. The 60 kw high frequency generator used in association with this mill is also small, measuring about three by eight feet, with a height of seven feet. It weighs 8000 pounds.

The mill is mounted on a platform raised several feet from the floor. The basic equipment consists of a motor-driven mechanism that draws the strip into the mill, moves it through forming rolls that effect the spiral shape and the desired diameter, delivering the formed open seam to the welding head.

The strip metal in a coil of several thousand feet is on a stand at the end of the mill, entering at a pre-set angle (which is easily adjustable) to produce the desired number of spirals per foot. (The greater the number of spiral welds per running foot, the greater the stiffness of the tube.)

As the strip is coiled in the mill, it makes an elongated "V," and the weld occurs at the root of the "V." Two sliding contacts, one on either side of the open seam, introduce the high frequency current into the metal.

Why It's So Fast

The two contacts ride about one or two inches from the root of the "V." Due to the "narcissism" of high frequency current, it hugs the opposite edges of the metal. This skin effect produces localized high intensity heating so the edges at the root of the "V" reach welding temperature.

Pressure applied at the root of the "V" results in a forged weld—lap, mashed lap, or butt-edge, as desired. This method permits tubing or strips of ferrous or nonferrous metal to be welded at very high speeds (longitudinally at 1000 fpm. with .004-in. metal).

At the present time, 1½" O.D. tubing is the minimum size that can be pr duced by this mill, due to the fact th a mandrel must be introduced inside t tube to effect a mashed lap weld. It h been determined that the mashed we is the most effective, and in this proc the difference in wall thickness at t weld point is negligible. Tubing up 10 feet diameter can be welded.

Developments are now in progr which will probably permit tubing smaller diameters in the near futu Tube ranging from 0.0004 to ⅜-in. w thickness can be welded.

Spiral Tube Welder

The Thermatool spiral tube weld can weld ferrous and nonferrous met including aluminum, copper, and t rarer metals, such as zirconium. Due the stiffness that the spiral weld gives tubing, the wall thickness can be su stantially reduced. Such an econo could be very evident in the producti of large tubing such as used in barr and other cylinders of that type.

The mill is small and light enou to be mounted on a mobile unit. diesel engine can be utilized to opera a generator and supply power to Thermatool high frequency generat The strip metal can be delivered to t field unit in coils of 2000 or more fe and tubing can be produced at a desired location.

Use It On-Site

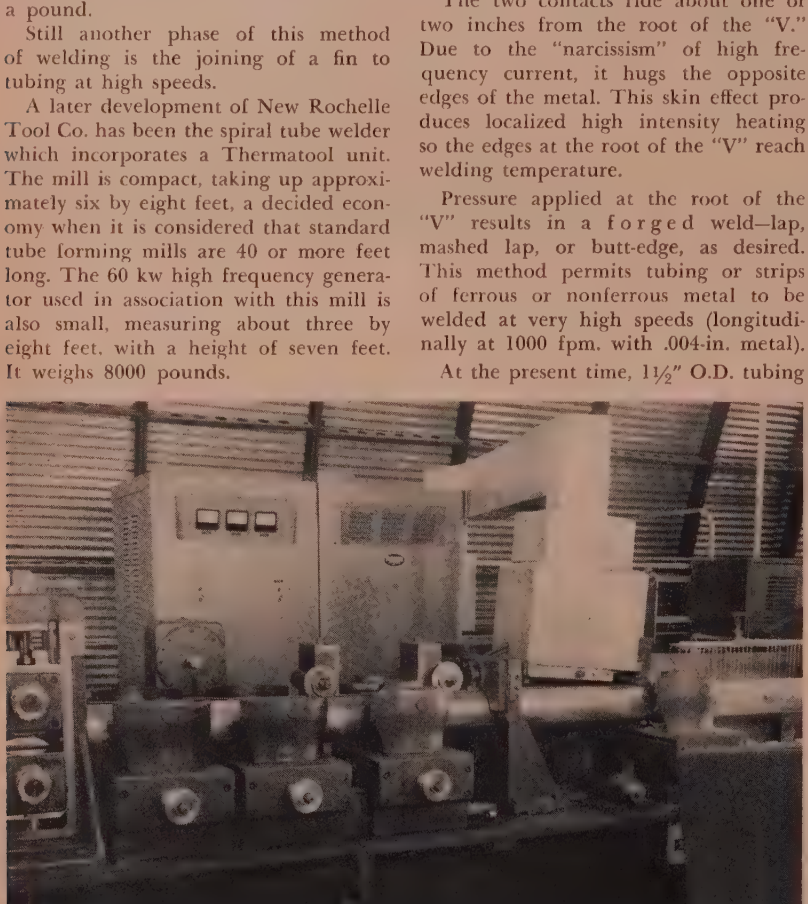
Users of piling will find this type tubing highly advantageous for the work, as a lighter weight metal can used in the forms for concrete piles, a still have greater stiffness.

As a mobile field unit, Thermato could be used to make irrigation pi with great speed. It could also be us to provide emergency water and sewa service.

High speed production, i.e., 3-in. tu ing of tin plate stock at 150 or more fe per minute, is obtainable. By increasi the power supply the speed can be i creased.

Two semi-skilled workmen can ope ate the mill, while electrical maint nance can be handled by the plant eng neer. Down time is only a few minut to start a new coil of strip, or to chan the diameter of the tube, or to chan the number of spirals per foot. Maint nance cost is negligible. The weldi contacts, with a life of approximate 100,000 feet or more of weld, can changed in five or six minutes.

High frequency resistance welded tu by the Thermatool method is now su planting seamless and arc welded tubi in many instances, due to its excelle quality and the distinctly lower co This tubing is currently being used f many applications never before consi ered acceptable with welded tube.



■ ***A section of the forming mill at Alcan's Kingston, Ont. plant. The high frequency resistance generator is in the background and, encased in this installation is the input transformer. Six-inch aluminum irrigation pipe is being produced. By way of comparison, J.F.D. Mfg. Co., Brooklyn, N.Y., produces its own very small diameter tubing for TV antennas and other home equipment. They entered the aluminum tubular furniture field as a result of Thermatool's high capacity.***

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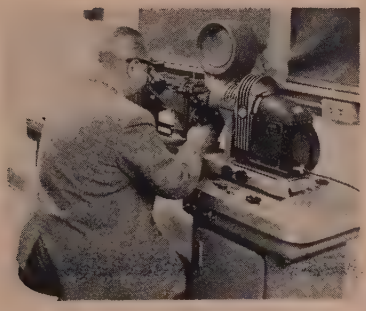
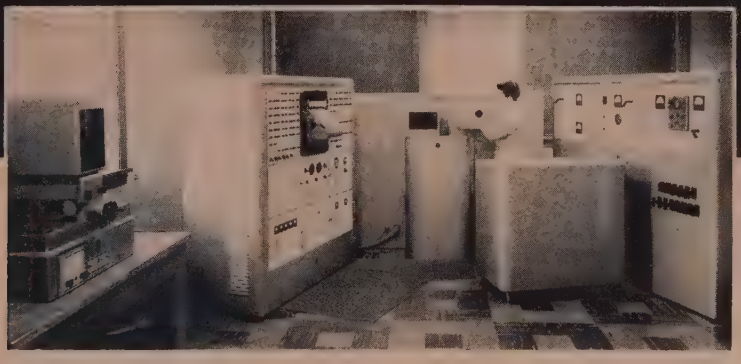


METALLOGRAPH

RESEARCH LABORATORY



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■ *Permanently anchored cables of canopy structure assure that it will withstand winds up to 80 miles per hour. Terraced lawn in left foreground was planned for informal seating of 19,000 audience.*

ACRE-SIZED ALUMINUM 'TENT' WINS REYNOLDS ARCHITECTURAL AWARD

Unique suspended "roof" of Sydney Myer Music Bowl in Melbourne wins coveted $25,000 prize for Australian architectural team. Half-inch thick roof panels measuring 25 by 7 feet consist of marine plywood sandwiched between aluminum sheets; are internally pre-stressed during bonding, thus preventing distortion due to differential expansion. Excellent acoustical design projects concert hall sound quality for up to 22,000 spectators.

A UNIQUE, tent-like band shell cover has won the 1959 R. S. Reynolds Memorial Award for an Australian architectural firm. This marks the third consecutive year in which a jury of American architects has awarded the coveted prize to a foreign entry.

In the opinion of the AIA jury, the Sydney Myer Music Bowl in Melbourne, Australia represents "the most significant work of architecture, in the creation of which aluminum has been an important contributing factor." The $25,000 prize goes to Yuncken, Freeman Brothers, Griffiths and Simpson of Melbourne.

Shaped somewhat like the canvas shelters of the American back-country revival meetings, the Music Bowl's 40,000 square feet of aluminum-surfaced roofing gives concert hall acoustics — "from full orchestra down to pin-drop pianissimo." This acre-sized umbrella stretches 200 feet at its widest point, measures about 200 feet long, and reaches 70 feet high at its highest point.

In this dramatic structure, the jury noted, aluminum is used "not as ornament, but as an intrinsic element of shelter and acoustic reinforcement. The structure (brings) the sound and sight of a musical performance not only to 2100 people seated under the aluminum roof, but to 20,000 others seated on the lawn under the sky. The design accomplishes this relationship gracefully, with maximum efficiency and unity."

The bowl's unique form derives from two basic needs: 1. To convert a gently sloping lawn in a central city park (the King's Domain) into an amphitheatre for a vast audience; and 2. To protect it from the roar of traffic, railway yards and sports grounds near the site.

"The solution lay in excavating and banking, and expanding the normal orchestra shell to enormous proportions," the jury's report noted, "thus creating an island of silence in which audiences of 22,000 could see and hear serious musical performances with complete acoustic integrity."

Problems Solved

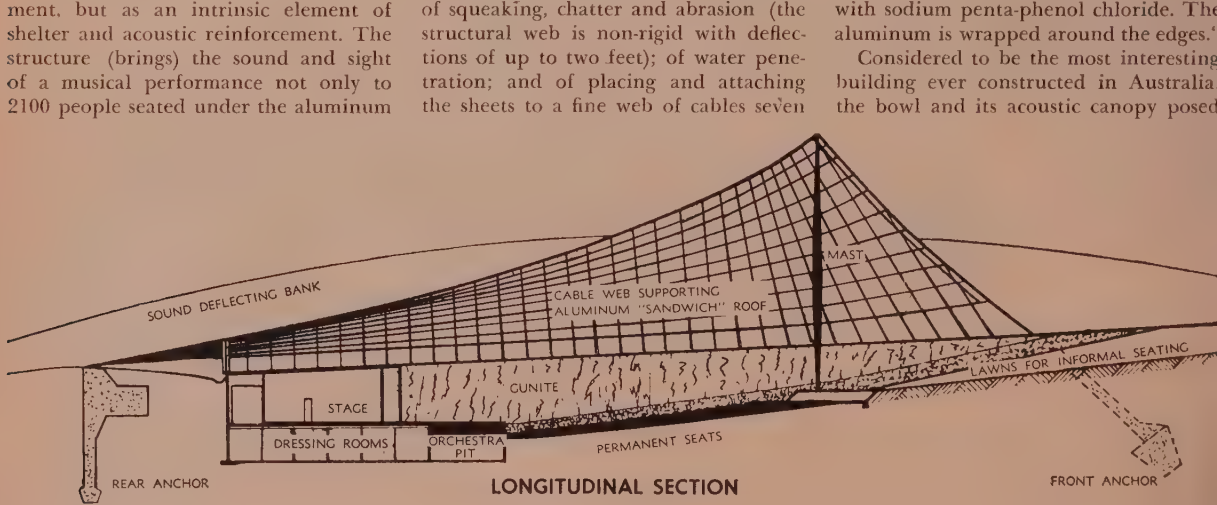
Research for the most suitable cladding material for the shell surface produced only one having all of the essential characteristics: An aluminum faced plywood. Satisfactory solutions were devised to overcome the hazards of squeaking, chatter and abrasion (the structural web is non-rigid with deflections of up to two feet); of water penetration; and of placing and attaching the sheets to a fine web of cables seven feet apart and 70 feet above ground.

The ½-inch thick roof panels, measuring 25 feet long by seven feet wide, consist of marine grade plywood, covered on both faces with 26 gauge aluminum. The five wood laminations are bonded with synthetic phenolic resin, dry tissue glues. The aluminum is bonded to the cores with a special tissue glue, joints on weather faces being welted, and butted elsewhere.

Bonding takes place in one operation in hot presses between plates measuring 25 feet x 7 feet, six inches, operating at 310°F with a pressure of 125 psi. Both sides of the sheets are satin finished by wire brushing. The heat expansion in the skins during manufacture tends to place the cores in a pre-stressed state of compression.

"Consequently, the aluminum panel can be exposed to sun on one face and shade on the other without any noticeable distortion due to differential expansion," the architects said. "Where sheets were cut to shape on the site the exposed plywood edges were treated with sodium penta-phenol chloride. The aluminum is wrapped around the edges."

Considered to be the most interesting building ever constructed in Australia, the bowl and its acoustic canopy posed



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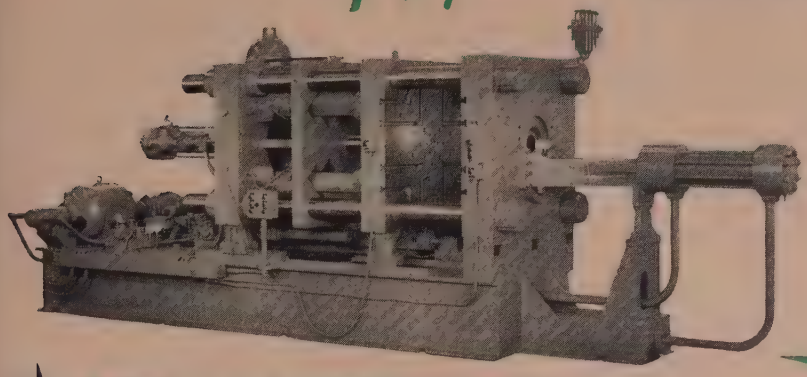

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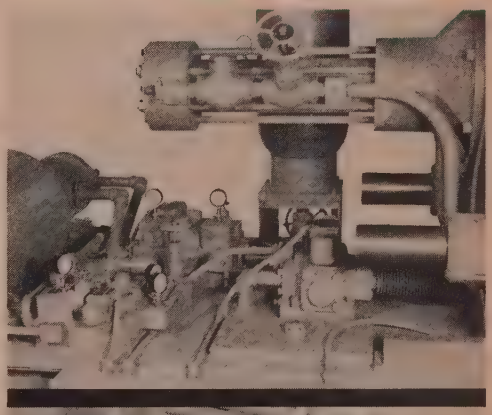

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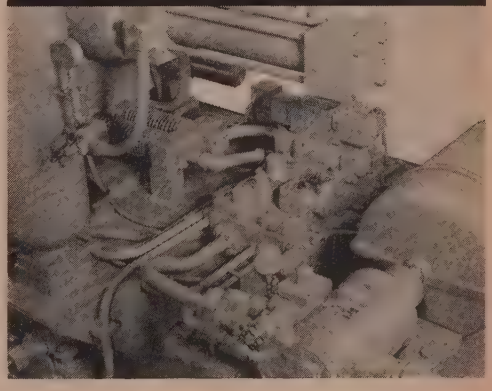
Non-inflammable hydraulic oil is expensive and leakage losses are costly. With the B&T STANDARD system, loss of oil is negligible. Pipes have weldon fittings, socket welded to flanges which are bolted together with an "O" ring seal between mating surfaces to prevent leaks. Leaks cannot be caused by the normal hydraulic surges of a die casting machine because B&T uses heavy, rigid piping clamped firmly to the base at frequent intervals.



3. CUTS MAINTENANCE COSTS!

The B&T method of piping also saves time in disassembly, since it is only necessary to remove 4 bolts at each end of a pipe to free it from mating cylinders or parts.

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new design problems. The architects called on the services of consulting engineers experienced in the structural problems involved. An aeronautical engineering consultant conducted wind tunnel tests on a scale model of the canopy to determine wind pressures which would have to be resisted to prevent the roof from blowing away or collapsing.

The most interesting technical feature is probably the canopy — a suspended structure of 1⅜-in. diameter galvanized wire rope, spaced at about six-foot centers in both directions. The total length of cable is 15,000 feet. The main cable at the leading edge of the roof was especially made in Newcastle, Australia. It consists of seven ropes, each about 3½ inches diameter and 568 feet long. They are anchored 70 feet into the ground in a large concrete block. Thirty-five longitudinal cables running north and south hold the roof up; they are fastened at one end to the main cable and at the other end to a heavy anchor block.

Transverse cables hold the roof down and are fastened at each end to a long reinforced concrete anchor strip buried 10 feet in the ground. The roof panels are fastened to these cables. The main cable is held up by two 72-ft. fabricated steel masts which are covered with fiberglass to give a cigar shape.

The stage has an area of 6000 square feet; beneath it are facilities for performers which include orchestra change rooms, private dressing rooms, large changing areas, shower rooms, kitchen and tea room and several offices. There are also two flanking buildings which hold the manager's offices, electric power facilities for radio broadcasts and stage lighting controls, and toilet facilities.

"The architects solved many significant problems with utmost simplicity and ingenuity," the jury reported. "First, they tackled the problem of outside noise interference. By an ingenious site plan and the use of molded ground coupled with judicious overhead shielding, they isolated the performance from nearby city noises. Second, they solved the problem of shelter by the skillful configuration of a tent-like hanging roof, achieving a form suitable to its purpose — a band shell drawn out to cover a section of the audience. Compression is consolidated in two vertical steel columns. All structural members are cables."

The hanging roof always has two inherent problems, the architect-jurors pointed out: The first is to achieve a saddle-shaped contour so that the cables in one direction will hold the roof up, and cables strung in the other direction will hold it down. The other problem is the covering material, which usually creates difficulties. The large thin aluminum sandwich panels are a "superb" answer to the problem.

Roof Panels Pre-stressed

"A recurring problem with this type of roof is the warped parallelogram formed by the basic web of cables," they said. "Choosing a material which can be job-cut is a 'fitting' solution. Choosing a metal which has the flexibility needed to bend according to the curvature of the roof is also excellent. The sandwich is pre-stressed and therefore controlled. The aluminum skins, applied in hot presses, shrink after manufacture, keeping the plywood in compression."

■ ***Aluminum-clad plywood panels are being set in place on cable web of the Sidney Myer Music Bowl. Exhaustive tests showed that this sandwich was best suited for the job, both acoustically and as a wind and heat resistant material.***

The jury agreed that the design of the Sydney Myer Music Bowl roof has considerably broader application.

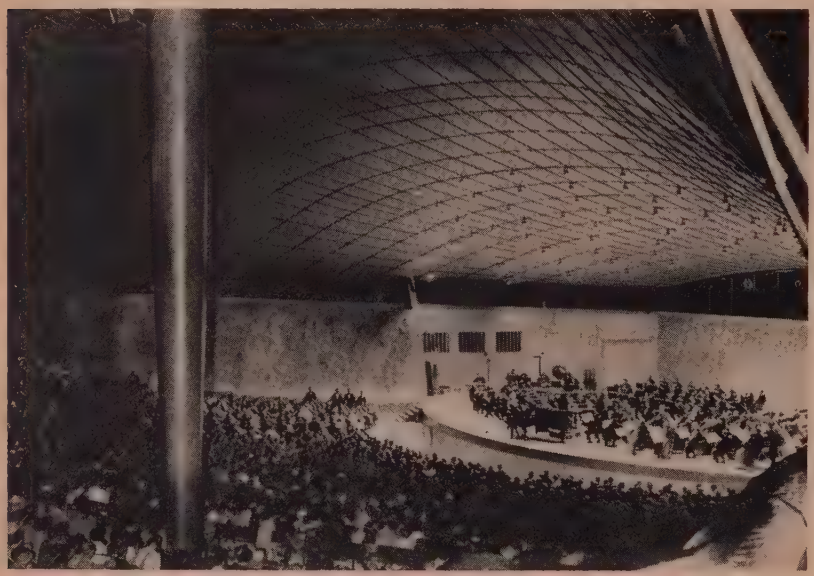
"We are coming into an era where larger and larger lightweight, space-spanning structures will be needed," they said. "Many drawings or diagrams of what such shapes might be have been published, but few proposals have solved the difficult problem — the skin."

The R. S. Reynolds Memorial Award, established by Reynolds Metals Co., is administered by the AIA. It consists of a $25,000 honorarium and an emblem in the form of a piece of original sculpture designed in aluminum by a leading artist. The award will be made this month during the annual AIA convention in New Orleans.

The jury considered 52 entries from the U. S. and 11 other countries. Chairmanned by Robert E. Alexander, FAIA, the jury also included John Noble Richards, FAIA, president of the Institute; Eero Saarinen, FAIA; William W. Caudill, AIA; and Carlos Contreras, Mexico City, Honorary Fellow of the AIA.

Alfred Wallenstein, noted American conductor, who conducted the combined Victorian and Sydney Symphonic orchestras when the Music Bowl was officially opened last February, gave the award his unqualified approval.

"The Sydney Myer Music Bowl is beautiful, practical, and acoustically satisfying," Wallenstein said. "This honor should help stimulate American cities to consider applying these simple concepts to *their* music bowl designs."



■ ***Skin for the web roof of the award-winning Sydney Myer Music Bowl called for aluminum for several important reasons: Low initial cost and minimum maintenance; ability to repair or maintain from above (no scaffolding); suppression of external noise; acoustical properties equal to concert hall standards; no drumming noise on roof during rain; and permanent good appearance in park setting.***

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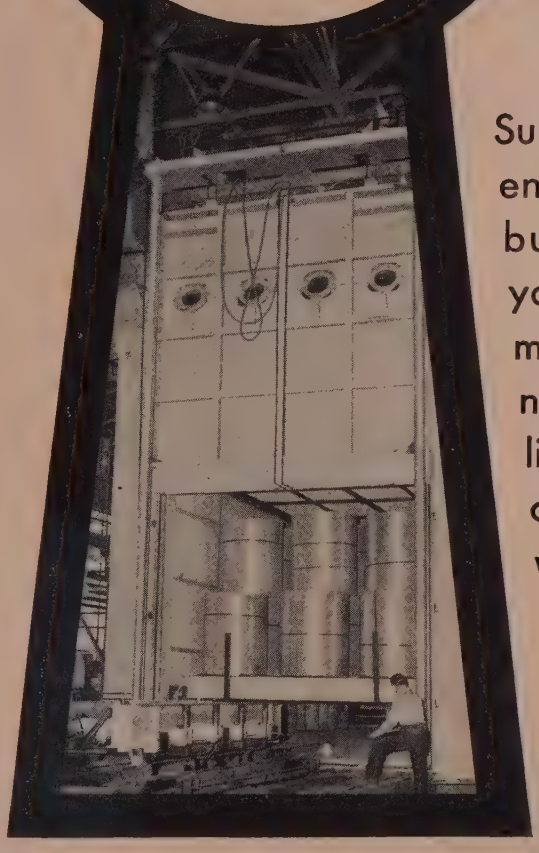

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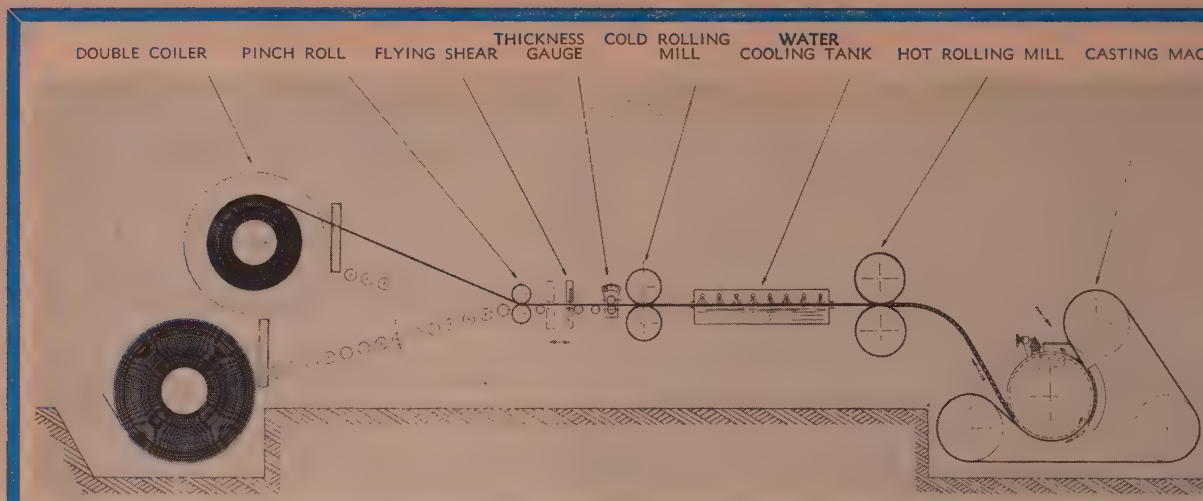


■ *Production flow of the Lobeck continuous aluminum strip casting line is from right to left. Melting furnaces not indicated.*

VOLUME users of narrow aluminum strip will be interested in the continuous strip casting machine recently unveiled by Lobeck Casting Processes, Inc., New York 16. Based on a unit designed by the Pechiney organization in France, and now in full production there, the new machine is said to have been developed as a low-cost, integrated production line for users of strip in such fields as impact extrusions, roll formed sections, electric lamp bases, awnings, venetian blinds and containers.

"Lobeck has been granted a license by Pechiney to build and sell this equipment in North America," an executive of the firm reported. "With only a modest capital investment, users of various widths of aluminum strip can now take the 'do-it-yourself' approach, performing their own melting, casting and rolling within one integrated operation.

"Compared to the conventional purchase of cold finished strip, the new method offers the major advantages of lower raw material costs, process scrap recycling, reduced metal inventory, faster strip availability, and improved quality."

The casting line is fed by a combination of melting and holding furnaces charged with scrap and ingot. A launder connects the holding furnace with the casting machine and metal flow is accurately controlled by a valve.

The heart of the machine is a five-foot diameter wheel with a trough-shaped groove along its circumference. The depth and width of the groove determine the dimensions of the "slab" to be cast. Thickness usually varies from ½-inch to 1-inch. Widths normally range from 6 to 12 inches. For the production of different widths, different wheels are used; they are readily mounted on the casting machine shaft.

The groove is closed for casting purposes by an endless steel belt running along part of the casting wheel circumference and over three guide sheaves. Temperature of the metal coming off the casting wheel is 780°F., but the casting wheel and the belt are subjected to intense water cooling, causing the metal to solidify into continuous slab during its travel along the wheel circumference.

Integrated casting-rolling line is designed for low cost continuous production of aluminum strip; can turn out a 4-ton coil of 8-inch wide strip in an hour.

"A particularly sound metallurgical structure is obtained because of this fast chilling action," the Lobeck executive said.

Upon solidification, the slab leaves the wheel and feeds continuously into the adjacent 2-high hot rolling mill where it is subjected to a heavy bite. For example, if the as-cast thickness of the slab is ¾-inch, gauge of the metal coming out of the hot mill would be 0.200-in.

The resulting hot rolled strip passes through a water cooling unit before entering the 2-high cold rolling mill which gives further heavy reduction. The thickness of the cold finished strip is continuously measured by a "flying mike," and a flying shear cuts the strip whenever a full coil has been obtained.

Double coilers equipped with collapsible drums are provided to assure continuous operation of the line, with one coiler winding strip while the other is being unloaded. The entire line, from the casting wheel to the coilers, is electronically synchronized and centrally controlled from a console. Lobeck says that only three men are required to run the entire operation.

In a representative installation, ⅛-in. x 8-in. wide 3003 aluminum alloy strip is produced in 16-inch ID x 50-inch OD (1300-pound) coils, at a continuous rate of about four tons per hour, Lobeck said.

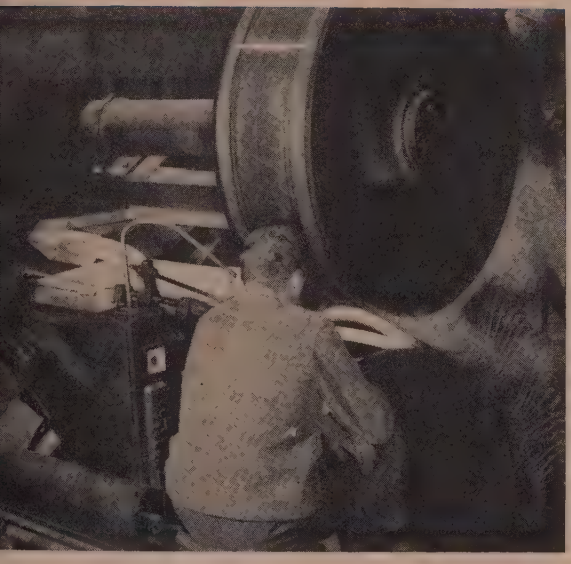
"For such uses as impact extrusion, coilers are not required and the cold rolled stock is fed directly into a blanking press producing slugs," the firm explained. "To obtain thinner gauges of strip, the ⅛-in. stock is processed further in a tandem cold reduction mill capable of output speeds up to 1000 feet per minute."

In addition to 3003, the machine is reported to have successfully cast alloys 1100, 3004, 5005, 5050 and 5052.

Lobeck Casting Processes thinks ready markets for the continuous strip casting line are offered by the packaging field (can makers and brewers); roll-up tube manufacturers, manufacturers of roll formed tubing for the furniture and antenna fields, and many others.

■ *Double coilers of the Lobeck continuous strip casting line. Collapsible drums assure speedy coil unloading. Cast strip offers conveniences to many kinds of aluminum fabricators.*

CONTINUOUS TRIP FROM MOLTEN METAL TO COILED STRIP



■ *The beginning of the Lobeck continuous strip casting process is shown at left, where molten metal is issuing from the launder into the groove of the large casting wheel which is almost hidden from view by the attendant. Large upper wheel is one of three pulleys for the endless steel belt which contains the hot metal in the casting groove.*

■ *In this picture, finished cold rolled aluminum strip is coming out of the pinch rolls and is being coiled on one of two alternate coils. The Pechiney - designed system offers low-cost, integrated production of aluminum strip.*

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Dick Pulliam
MODERN METALS
Tribune Tower
Chicago 11

KEEPING IT CLEAN . . . at a big foil container factory is an exacting job that has been greatly simplified by systematic use of industrial paper towels

by L. W. Schumm, Vice President, Manufacturing, Ekco-Alcoa Containers, Inc., Wheeling, Ill.

SYSTEMATIC programming of industrial wiping procedures is an absolute necessity in the production of rigid aluminum foil containers at the Wheeling, Ill. plant of Ekco-Alcoa Containers, Inc.

When the plant began production in February 1956, our industrial wiping program had been studied and a course of action decided upon. The main objective of the program was to provide plant employees with the right wipers for the particular jobs. Applications were classified as heavy-duty, general purpose, and miscellaneous.

Based upon past experience in foil production at the Aluminum Co. of America plant in New Kensington, Pa., a different type wiping material is specified for each application. Cloth towels are used for wiping up extra-heavy greases and lubricants from machinery. For general purpose jobs, paper wipers developed by Scott Paper Co., Chester, Pa., have proved to be the most efficient and economical material available. Baled waste is suitable for miscellaneous wiping applications such as mopping up oils spills from the floor, or jobs not directly concerned with production.

The wipers used most extensively in the plant are Scott Wipers. They are used for the following applications:

1. In the mechanical engineering department for wiping up oil, grime, and grease resulting from maintenance and repair of dies, machinery, and auxiliary production equipment.
2. In the foil department for personal wiping of hands.
3. In the press department for removing oil and grease from machinery, and to brush away dirt or other foreign material which might interfere with the efficient operation of the dies.
4. In the shipping and warehouse departments for personal wiping.

Scott Wipers also meet the personal needs of employees in the mechanical engineering and press departments.

Employees Like Them

The welfare of each employee is important because each performs a vital job in the production of rigid foil containers for packaging needs in the baked goods, frozen, and processed foods fields. Management supplies the paper wipers for the safety and convenience of plant employees.

Employees prefer them because every wiper is clean and the risk of dermatitis is eliminated. Packaged in self-dispensing cartons, clean paper wipers are available both for personal use and job application. Possibility of cuts and scratches resulting from hidden metal chips and slivers frequently found in textile wiping materials is also eliminated.

Important from a production standpoint, Scott Wipers enable shop personnel to develop certain wiping skills that are not possible with textiles of varying physical characteristics, materials, and absorbency. They are uniform in size and wiping capacity. In lapping operations, for example, workers know precisely how long they can use a paper wiper to remove oil and lapping compound from an item before they need a clean one. This enables personnel to work faster and more efficiently. There is no delay in trying to pick up more compound than the wipers will hold.

Paper wipers are also effective for removing liquefied grease from punch presses. When the machines are operating, grease on ways of the press becomes heated, liquefies, and drips. It must be quickly removed before reaching and staining the die or the foil containers being produced. The nubby surfaces of Scott Wipers help to penetrate and collect these drippings, thereby maintaining a grease-free operation.

Hundreds of tiny pockets on wiper

■ *Three uses for Scott Wipers at Ekco-Alcoa Containers, Inc. At left, fittings and tubes on a rolling mill are kept clean to prevent oil from dripping onto aluminum foil during rolling. In center, paper wipers are being used to soak up lapping compound from a die draw ring after lapping. Frequent wiping is necessary because worker must check polish of draw ring constantly during operations. At right, liquefied grease is being removed from punch press ways.*

surfaces also help to collect dirt and grit generated in punch press operations. These particles are removed frequently during the day to protect the operator from nicks and cuts, and to keep the presses and working area clean and the die sharp.

One of the vital jobs is to keep the rolling mill operating so adequate foil is available for production. Vapors arising from rolling lubricants used in rolling aluminum foil are exhausted through a hood, but some condense and must be wiped off to prevent dripping on the foil. In this application, the paper wipers absorb moisture and oil quickly.

We have also set up a regular wiping routine for plant oilers, who daily check machinery and equipment to assure proper lubrication. A box of paper wipers is placed on oilers' carts and they are instantly available for removing excess grease from fittings, lubrication check points on equipment, and grease guns, thereby facilitating the service chores.

Dirty wipers are disposed of in trash barrels conveniently spotted in all plant areas so that workers don't have to put oily and messy wipers into their pockets or leave them scattered about the plant. Soiled wipers are removed daily, thus reducing the fire hazard that was previously encountered with accumulated oil-soaked wipers. Elimination of litter also gives employees cleaner surroundings in which to work.

Big Savings in Time

An outstanding benefit realized by the use of paper wipers is time savings. Foremen issue a box of Scott Wipers to personnel in each department area. An empty box must be turned in before a full one is issued. Foremen merely throw out the empty box, but this practice curbs waste.

Availability of the paper wipers also eliminates time taken by employees to obtain rag wipers which are stowed in bins. Workers must separate usable rags from unusable ones because as these supplies are received, many shredded wipers and fabrics that are completely useless are mixed in with cloths that are still serviceable. Separating the good from the bad takes considerable time, and a multitude of unusable rags must be removed periodically from the bins due to the large amount of space they occupy.

In this respect, the paper wipers are more convenient to handle and distribute. They also eliminate waste and storage problems, and help to reduce wiper expenses both in initial cost and disposal.

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The STREAMLINER is designed to perfectly blend into the Z-rail, giving it a concealed effect. The hinge is still mounted in a conventional manner. Fabricating problems are cut to a minimum since there are no springs, washers or pins to assemble . . . the Streamliner comes complete, ready for mounting. Free of patent infringements.

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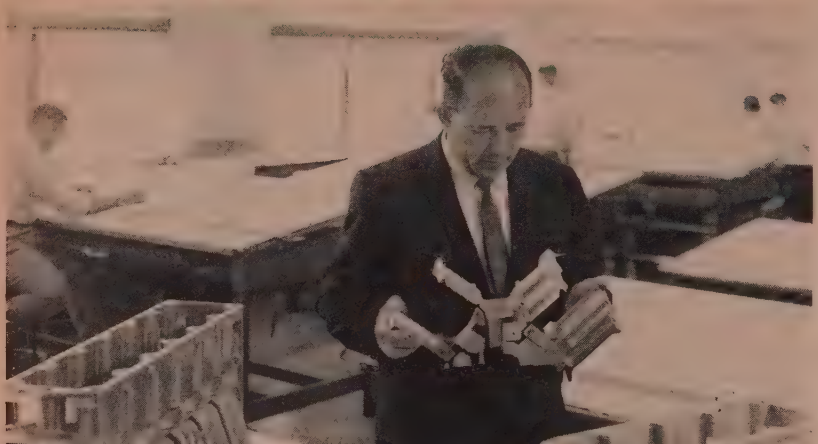

Die Cast Eight-Cylinder Engine Block Patented

A patent for a die cast eight-cylinder aluminum automobile engine block has been issued to Alfred F. Bauer, assistant general manager and chief engineer of the Doehler-Jarvis Division of National Lead Co., New York. The patent has been assigned to the parent company.

A solution for the economical design of a die cast aluminum V-8 engine block is covered by the patent. The project, which is a Doehler-Jarvis development, is a significant step in the American trend toward greater use of aluminum in automobiles.

The design, which is appliable to all V-8 engine blocks, eliminates undercuts, projections and blind passages, and allows for the efficient mass production of engine blocks by die casting. In addition, smooth, uniform lubricating and cooling passages are cast directly into the aluminum block, permitting unobstructed flow of the fluids used.

There is a longitudinal oil passage formed between the block and a separately cast cam shaft housing. This passage provides improved lubrication of crank shaft and cam shaft bearings, as well as valve tappets, and eliminates costly machining operations now required to drill lubrication passages. Double wall construction is used to increase strength and rigidity.

A V-8 engine block can be turned out at a faster rate and more economically as a die casting than by other methods of production. Aluminum blocks develop more horsepower per unit weight than the conventional sand cast gray iron blocks. Substantial cost savings can be realized through the small amount of machining required on die cast blocks, as compared with blocks fabricated by other means.

The weight of a die cast aluminum block for an average V-8 engine is 55 pounds, a weight saving of more than 150 pounds over a similar block in gray iron—the type in general automotive use today. Bauer is shown examining a section of a V-8 auto engine block. In the foreground is a six-cylinder aluminum engine block designed and die cast by Doehler-Jarvis.

The new design takes full advantage of the high thermal conductivity of aluminum, which makes possible the use of smaller water channels and a smaller radiator, creating an additional weight advantage.

Doehler-Jarvis' work on die cast aluminum engine blocks for cars began in 1951. It progressed from design of a four-cylinder block weighing 28 pounds, through design and experimental production of a six-cylinder block to this latest achievement. During this period the Division built the world's largest die casting machine, designed to turn out aluminum castings weighing up to 75 pounds and with the capacity to accommodate dies for the V-8 blocks.

Doehler's great depth of experience in engine block die casting practice places it in an enviable position as the trend toward lightweight engines in smaller cars picks up speed.

As of now, however, the Division's one giant machine could hardly take care of the potential — perhaps 82 million pounds of aluminum for blocks alone by 1961 — but the Division has a handsome lead.

Titan ICBM Uses Magnesium-Thorium Alloys

Approximately 40% of the skin structure of the Titan intercontinental ballistic missile is magnesium-thorium sheet and extrusions, according to the Denver Division of The Martin Co. Specific alloys used are HM21A and HK31 sheet and HM31A extrusions.

Total magnesium-thorium weight in the missile is about 2000 pounds. The magnesium-thorium alloys were developed by The Dow Chemical Co. specifically for application in supersonic missiles and aircraft.

Magnesium-thorium sheet is used in four transitional sections of the Titan skin as follows: (1) between the stage I fuel and oxidizer tanks, (2) between stage I and stage II, (3) between the stage II fuel and oxidizer tanks, and (4) between stage II and the nose cone.

In addition, magnesium-thorium extrusions are used for the external conduits between fuel and oxidizer tanks in both stages and for such internal structural parts as stringers, longerons and hinges.

Roll Forming Line Said To Be Nation's Widest

This combination decoiling, straightening and roll forming line is said to feature the widest cold roll forming mill in the U.S. Recently built by the Aluminum Supply Co., Spokane, Wash., the equipment is now on the job at the Trentwood, Wash. plant of Kaiser Aluminum & Chemical Corp.

The complete line is 155 feet long and can form building products continuously from coiled stock at 150 f.p.m.

The ASC production line and mill handles aluminum coils five feet wide and weighing about three tons. Coils are loaded on a reel and automatically fed onto a conveyor table where they are continuously cut to desired length.

Cut sheet is conveyed into the 24-stand mill where roller dies progres-

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After you've "looked 'em all over," it's refreshing to see the special and scrupulous care Bridgeport devotes to *every* order, large or small. No other maker of aluminum extrusions and forgings offers this unique *combination* of seven prime advantages!

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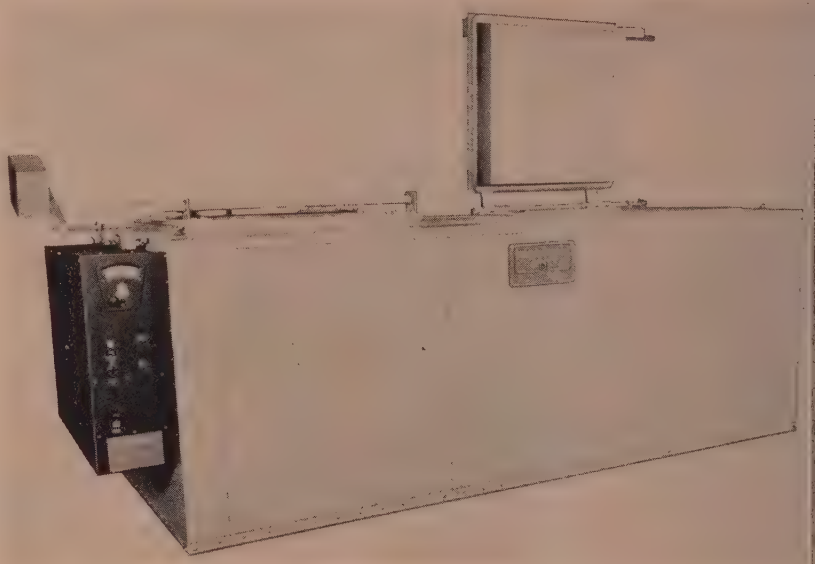
Dick Pulliam
MODERN METALS
Tribune Tower
Chicago 11

sively form the sheet into the desired configuration. The finished product is then stacked and packaged at the exit end of the mill, ready for shipment.

Kaiser will use the line for fabrication of a variety of aluminum building panels. To insure a high degree of quality and close uniformity of finished products, this new equipment was in the design stage six months. A pilot line was operated by ASC for over a year before beginning construction.



Extrusion Die Heater Has Low Loading Height

A new extrusion die heater made by Grieve-Hendry Co., Inc., 1393 W. Carroll Ave., Chicago 7, is reported to have several design innovations, among them a convenient top side loading height of only 37 inches.

Another operational convenience offered is counterweighted doors which will remain safely opened or tightly closed. These doors are furnished with a limit switch to shut off the heat when opened, eliminating the hazard of hot air blasts hitting the operator.

This new die heater is available with either one or two compartments. Each compartment is 27 inches high and provides over 14 cubic feet of work space.

Temperature uniformity of ±10° F. throughout the work space assures correct die temperatures regardless of die location and also prevents distortion of dies caused by temperature variation. Extremely sensitive temperature control prevents overheating of recirculated air and resultant decarbonization of polished die surfaces.

The new Grieve-Hendry die heater is available with either gas or electric heat sources. The gas fired models feature an exhaust outlet from the pressure side of the recirculating blower, eliminating the need of an exhaust blower to insure discharge of combustion products.

Auto Maker To Use Titanium Anodizing Racks

Mallory-Sharon Metals Corp., Niles, Ohio, has received a large order for commercially pure titanium, to be used in racks for the anodizing of automotive aluminum trim parts. The racks will be made by Carlson-Erie Co., Erie, Pa., for use in a new plant of one of the country's leading auto makers.

Design specifications for the racks were worked out with the assistance of Mallory-Sharon metallurgists.

Titanium is replacing aluminum in anodizing racks because it requires little or no maintenance, has excellent corrosion resistance, and, in its anodized form, is a satisfactory electrical conductor. Although titanium is normally attacked by sulfuric acid, in anodizing operations the titanium receives an anodic coating which not only protects it from attack but is also electrically conductive. This means that no stripping operation is required, as in the case of aluminum racks. Another important advantage is that extremely uniform color anodizing can be achieved, with rejects held to a minimum.

Mallory-Sharon metallurgists estimate that repair costs on titanium racks run approximately $1 per rack per year, compared to maintenance costs as high as $175 with other metals.

Aluminum Foil Keeps Ice Cream Cold

A rotogravure-printed aluminum foil carton has been introduced by Penn Dairies, Inc., Lancaster, Pa., for their half-gallon of "Pensupreme" ice cream.

"The new foil carton has eye-catching sales appeal and will give our ice cream far greater quality protection," said John F. Garber, Jr., president.

Produced by Reynolds Metals Co., Richmond, Va., the carton is one of several which have been introduced to the trade. Graphic art for the "Pensupreme" carton was created by Cawley-Neff Associates, Philadelphia, in cooperation with Reynolds' styling and design department.

"Aluminum foil reflects up to 95% of radiant heat and is 625 times more effective in carrying off heat than any other major packaging material," according to James M. Cullinan, manager of Reynolds dairy packaging market.

"By conducting heat to the bottom of display freezers where it is quickly dissipated, aluminum foil permits a constant cooling of the top layer of cartons and eliminates much of the 'softness' usually found in ice cream cartons on this layer, keeping ice cream on this level as much as 9° colder."

How To Pretty-Up a Garage

The entire facade of a 400-car garage in the center of Dallas, Texas, consists of intertwined circles of cast aluminum, anodized gold. The $550,000 structure was constructed for the Canal Randolph Corp., with Parking Facilities of Texas Inc. as operators.

In addition to six floors of parking space, the structure houses seven stores on the ground level. Main structure and interior of the building are pre-stressed,

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In painting aluminum . . . pre-paint conversion coatings provide tight paint bond, assure long-lasting protection against corrosion for the painted surface

In general cleaning of aluminum . . . use of proper cleaners removes all soils with complete safety to parts

In forming aluminum . . . proper lubricants smooth the fabrication process without harm to the metal surface or dies

In etching aluminum . . . produce a mat finish as you clean; or actually etch away excess metal

Oakite now has more than 30 materials especially qualified and *guaranteed* for proper aluminum conditioning.

There are etching and non-etching cleaners, drawing lubricants, barrel finishing compounds. Also paint strippers to reclaim rejects safely. And to assure better paint adhesion with improved corrosion resistance, you can't beat the Oakite *ChromiCoat* conversion coating process.

If you're working with aluminum and want to get the most from it, call in the Oakite man. Or, write for booklet F-8283 on conditioning special metals. Oakite Products, Inc., 45B Rector Street, New York 6, N. Y.

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pre-cast 50-foot concrete spans.

Architects and engineers in charge, A. J. Greenberg and Mark I. Finfer of Chicago, said they approached the project with the idea that even a garage is an integral part of the city picture. The structure is known locally as "the Gold Ring Building."

New Grain Carriers Have Aluminum Body, Chassis

A new type of grain carrier built for British Road Services illustrates the effective use of aluminum for chassis as well as body construction. Two grain carriers, built by G. Scammell and Nephew Ltd., 11 Fashion St., London, E.1, England, in cooperation with Carrimore Six Wheelers Ltd., Finchley, London, N. 12, have a chassis frame of channel and angle sections in Noral B51SWP aluminum alloy, a product of Northern Aluminium Co. Ltd., Banbury, Oxfordshire.

Two main channel members extend the full length of the body and are braced by three full-width cross-members at the front and by four at the rear, leaving a clear opening of 12 ft. in the center of the frame. Longitudinal mem bers in the rear accept the semi-trail bogey.

The body is 24 ft. 6 in. long by 7 1½ in. wide. It is constructed of Nor B51SWP aluminum alloy section M57S½H sheet and B51SWP plate. Th side panels are secured to the uprig members by lock bolts and both pane and uprights are bolted to the ma chassis members.

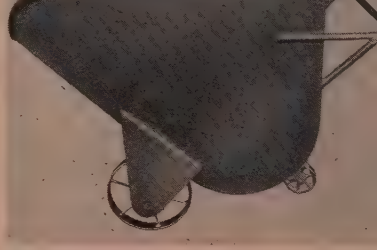
Capacity of the grain carriers is 10 cu. ft. They have been left unpainte in order to take advantage of alum num's corrosion resistance, according Noral.

Bright Dip Used For Preparation or Final Finish

An acid solution for producing brilliant luster on non-silicon aluminu alloys is made by MacDermid Inc., W terbury 20, Conn. Aluminum Bright Di No. 2 is used full strength at 170° 200° F., with immersion times from seconds to 1½ minutes.

The treatment may be used as a fin finish or as preparation for anodizin or plating. When used before anodi ing, the surface finish is more unifor with better dye absorption, accordin to MacDermid. Bright Dip No. 2 ma also be used to deburr aluminum wit dipping times over 1½ minutes.

Procedure for use is simply to im merse grease and oil-free work, follo with hot water rinse (120° to 150° F in stainless steel, ceramic, or PVC co tainer. Ventilation is recommended. Th solution is ready-to-use with a built-i wetting agent, and is does not involv detailed laboratory analysis.



Chip Buggy Given Improved Design

A newly designed aluminum chi buggy, weighing only 180 pounds bu capable of handling loads up to 1,80 pounds is now being manufactured b the Rolling Mill Division, E. W. Blis Co., Salem, Ohio. Weighing about 40% less than similar steel buggies, the ne model reduces handling fatigue, an provides corrosion resistance.

The new buggy has commercial whee in either plain steel rims or rubber tire

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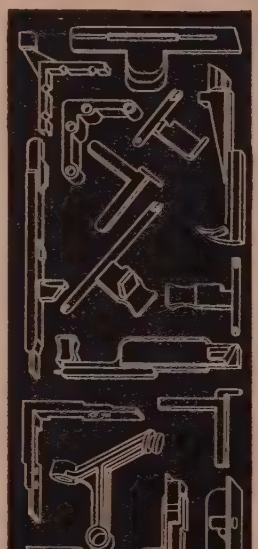

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units and a swivel wheel and bracket for easy handling in small areas.

Fabricated of 3/16-in. aluminum, the buggy is 44½ inches high, 30 inches wide and has a volume capacity of 32,000 cubic inches.

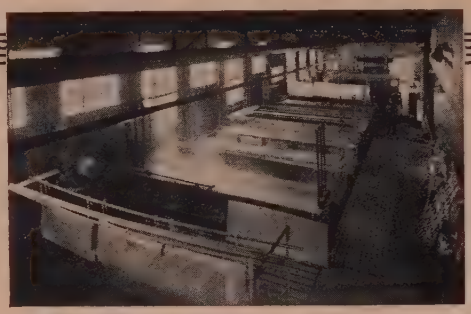
Luxury Car Tries on Brushed Aluminum Roof

A three-year program of Lincoln Division, Ford Motor Co., assisted by engineering personnel of Kaiser Aluminum, has culminated in the development of an experimental aluminum roof for the Continental.

The roof is completely fabricated and trimmed prior to its installation on the body, which provides for low assembly cost. By making use of aluminum extrusions, sheet and castings, Lincoln was able to complete the trial design in a manner which could lend itself to off line assembly.

The roof panel is aluminum shee with a brushed finish, and aluminum extrusions are used for the roof rails windshield header and back windo frame. Not only do these meet the struc tural requirements, but they serve a attractive integral exterior and interio moldings. About 35 pounds in roo weight are saved over a production stee roof.

The extrusion dies were specially de signed by Kaiser Aluminum, and th aluminum alloy selected lends itself t a variety of finishes through polishin and anodizing.



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Plastic Strippable Film Is Transparent, Flexible

A milky colored, concentrated emul sion has been developed by Chemica Consulting Service, 3711 S. Clemen Ave., Milwaukee 7, Wis., as a protectiv coating for metals and other material during manufacturing, storage an transit.

Called Strip-Kote, the material ca be sprayed or brushed on the work when dry it gives a transparent, toug film which is permanently flexible, ac cording to P. F. Dewey of Chemica Consulting Service.

"Strip-Kote will protect smooth an wrinkled metal finishes, stainless steel polished aluminum, name plates, glas and plastic surfaces," Dewey said.

The emulsion contains no inflamma ble solvents. Coverage of Strip-Kote wil vary according to the thickness of th dried film deposited, but Dewey esti mates that one gallon of the mate rial will give a 0.004-in. dried film ove a 500 square foot area.

New Line of Safety Hats Goes on Market

A new line of fiberglas, aluminum and plastic safety hats and caps ha been developed by Apex Safety Prod ucts, Cleveland, and will be marketed nationally and internationally by Boyer Campbell, 6540 St. Antoine St., Detroi 2. Both firms are divisions of White Sewing Machine Corp.

The headgear has been developed fo all industrial, mill and mining applica

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tions, and features a new polyethylene suspension which "provides the ultimate in hard hat safety," and assures minimum 1¼ in. clearance between crown and hat shell.

A second feature of the Apex safety hat and cap suspension is a plastic-zippered leather or leatherette sweatband which may be replaced quickly without replacing or disturbing the suspension.

A special feature of the aluminum line is a ribbing arrangement in the shell, providing unexcelled structural strength.

Niobium (Columbium) Extrusions Produced

Extrusions made from the "exotic" metal niobium (chemical symbol Nb) which is also known as columbium are being produced commercially by Wolverine Tube, Division of Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich.

The process was developed by Wolverine Tube engineers in cooperation with Wah Chang Corp., Albany, Ore., which supplied the niobium ingots as well as basic data on the metal's characteristics. In the past, the presence of small amounts of impurities in the metal prevented exploitation of its desirable strength and nuclear properties. These will make it an important construction material for rocket and missile components and atomic power plants.

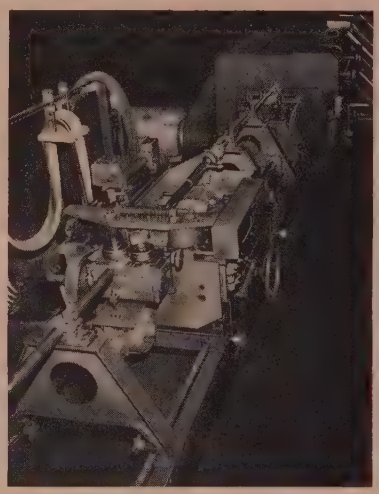
Wolverine Tube produced the extruded niobium rod and tube in the following dimensions: rod, ¼-1 inch diameter; tube, ½-1 inch O.D., .085 to .020 inch wall thickness; both rod and tube in lengths up to 20 ft. Other sizes can be extruded for special orders.

Pure niobium is extracted from the ore columbite which is quite plentiful. It has been used in small quantities as an alloying material in stainless steels and as a gas absorber in the manufacture of vacuum tubes.

LOMATIC

COMBINED DRAWING STRAIGHTENING CUTOFF AND POLISHING MACHINE

Payoff - Drawbench - Straightener



Flying Shear - Polisher - Discharge

Now available in two standard sizes, the revolutionary LOMATIC machines handle ferrous and non-ferrous rods and tubes at speeds up to 200 ft. per min. and with drawing capacities up to 16,000 lb. Compared to conventional separate rod drawing, straightening, polishing and cutting-to-length operations, the LOMA single-operation fully automatic machine offers the following major advantages:

- **Greater output rate — continuous operation at high speed**
- **Reduced labor cost — only one operator required**
- **Improved straightness — stock is straightened in two planes**
- **Perfect concentricity — obtained by straight-line drawing action**
- **Higher surface finish — due to two-stage polishing unit**

The complete line comprises an uncoiler, a pre-straightener, a drawbench, a roller straightener, a flying cutoff, a polishing machine and a discharge table. All components required for the complete sequence of processing operations are interlocked mechanically and electrically into one integrated and synchronized line which is controlled by only one operator.

Our standard line of equipment includes:

- **Casting Machines and Molds**
- **Saws and Cut-off Machinery**
- **Hot and Cold Rolling Mills**
- **Rod and Tube Draw Benches**
- **Roller and Stretcher Levellers**
- **Air and Hydraulic Tube Testers**

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

Aluminum Bearings May Solve Railroad Problem

Aluminum Co. of America will produce bearings using a special aluminum-tin alloy and test them in railroad freight car journal boxes.

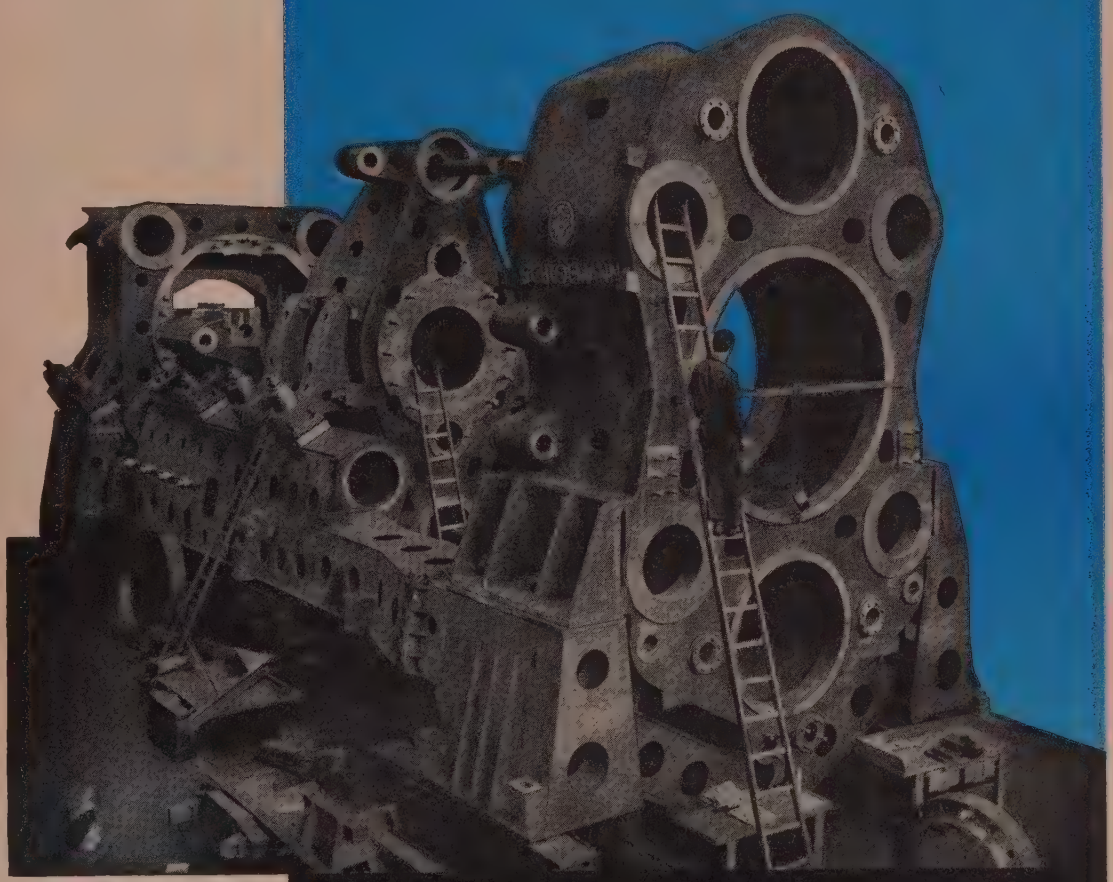
The Association of American Railroads has authorized Alcoa to conduct a study on 100 captive cars, in one phase of a program which may hold the long-sought answer to what railroaders consider their greatest single maintenance problem—"hot box" damage.

A hot box results when insufficient lubricant reaches bearings. In extreme cases, the resulting heat and friction melt or wear through the Babbitt lining and cause breakage of the axle.

Under laboratory test conditions, aluminum bearings have withstood severe scuffing for many hours longer than present low-cost bearing materials. Even when the Babbitt lining metal has been worn through, aluminum bearings hold up much longer than bearings of other material. Thus, trainmen have time to remove a faulty car from service before permanent damage results.

According to D. B. Wood, Alcoa's au

SCHLOEMANN



Another 14,000 ton Extrusion Press

About thirty years ago, SCHLOEMANN pioneered the concept of providing the light metal industry with giant presses. Designers were soon able to utilize forged and extruded pieces of sizes hitherto unobtainable and of low weight and high tensile strength. Thus, the prerequisites were created for new achievements in many fields. For example: On a SCHLOEMANN extrusion press for tubes and rods – the biggest in the world – aluminum billets up to 2.5 tons are extruded into sections for airplane construction, and these sections afford a saving in weight of up to 80 per cent compared with conventional sections fabricated by rivetting or welding methods. The picture shows a 14,000 ton extrusion press during erection in the shops. This is the second press of this size which has been built by SCHLOEMANN for Aluminum Company of America.

FELLER ENGINEERING COMPANY 1165 Empire Building, Pittsburgh 22, Pa.

ROLLING MILLS FOR FERROUS AND NON-FERROUS METALS • COUNTERBLOW HAMMERS • HYDRAULIC PRESSES

thority on aluminum bearing applications, success of the present A.A.R. authorized tests should lead to gradual change-over to aluminum bearings.

Aluminum bearings run up to 20° cooler than all other bearing materials, and resist corrosion without protective coatings. Alcoa reports that some aluminum bearing alloys have withstood forces exceeding 10,000 psi.

Of the four major types of journal bearings, aluminum costs much less than roller cartridge units, but more than the lowest priced bronze bearings. In experimental service, however, aluminum continues to perform long after low-cost units have been replaced. Some tests have shown that aluminum journal bearings have twice the life of their bronze counterparts.

Alcoa has previously cast aluminum journal bearings for experimental purposes. The present alloy, 750-T5, recently has withstood strenuous tests at Philadelphia's Franklin Institute, Pennsylvania Railroad's testing facilities at the Altoona car shops, and in the A.A.R. laboratory test facilities in Chicago. Installed in actual trucks, aluminum bearings performed well under full lateral stresses simulating tight curves at 70 miles per hour.

A giant step forward in the manufacture of Carbide Tipped Saw Blades

HEINEMANN'S

• GOLD-DOT •

CARBIDE-TIPPED SAW BLADES

For All Non-Ferrous Metals

The insertion of copper discs at the base of each expansion slot on the Gold Dot Saw has solved many problems which have plagued the users of carbide saws.

These discs give you a saw that is noiseless, vibrationless, smoother cutting, highly resistant to crackage.

Custom made from the highest quality steel and carbide available. Perfectly balanced, sharpened and tensioned.

Available in sizes from 4" to 36" diameter, any tooth spacing and thickness.

WITH LOCKED IN TIPS AND VIBRATION DAMPENERS

HEINEMANN METAL SAWS

FEATURING

• VACUUM LUBRICATION HOLES • SPECIAL STEEL
• EXPANSION SLOTS • EXPERTLY HARDENED
• RADIAL MICRO-GROOVE GROUND

With Vacuum Lubrication Holes for Cutting All Non-Ferrous Metals

Vacuum holes distribute lubrication evenly — teeth properly formed for fast chip removal and free cutting — ground to exact tolerances — double tempered — just a few of the many reasons Heinemann Metal Saws are so widely accepted for the cutting of aluminum, copper and all other non-ferrous metals.

Available in diameters from 5" to 24". In thicknesses from 1/16" to 3/8". Either straight sharpened, bevel sharpened, or triple chip sharpened.

Just write today for complete details on our quality saws.

MANUFACTURED BY

HEINEMANN SAW CORPORATION

CANTON 6, OHIO, U. S. A.

New Straightening Tool Is Versatile, Portable

A straightening tool for use by metalworkers on a great variety of parts and fabricated sections is a new product of Architectural Iron, Inc., 904 22nd St., Rockford, Ill. The multi-purpose straightener weighs only 22 pounds, thanks to the use of high-strength aluminum.

The "Straight-O-Flex" was developed to meet the need for a better method of straightening and curving parts in the manufacturer's own shop.

Because of its light weight, simple construction, and easy operation, it is readily carried and used in any position. Work to be straightened or curved bears on two adjustable support blocks, and pressure is applied by a lever, acting through an eccentric shaft which carries a roller-bearing-mounted pressure roll. Because of the high lever ratio, a pressure of five tons can be applied with very little effort.

Some of its uses involve the straightening of steel stair stringers after welding (see bottom photo); straightening channel door frames; drawing in curved railings to permit the posts to drop into their pockets; taking out the humps in pipe rail where horizontal top pipe is welded to the posts (see top photo); and straightening and curving bars, pipe, angles, rectangular tubing, etc. When bolted to a bench, it can be useful as a push press for forming special parts and operating small dies.

The frame, support blocks, and operating lever are made of high-strength aluminum alloy. The quick-adjustable support blocks provide for 63 different working heights or distances, giving a maximum of 2 5/8 inches and a minimum of 1/8 inch. Frame width is 19 inches, frame height 11 inches and the lever is 26 inches long. Other sizes are being developed, and special adaptations can be had to order, the manufacturer said.

Magnesium-Rare Earth Missile Alloy Developed

A new magnesium-rare earth alloy for missile applications has been developed by The Dow Chemical Co., Midland, Mich. Sand castings in alloy EK31XA are being produced by Dow for evaluation by prospective users.

EK31XA sand castings combine good room temperature tensile properties, with excellent tensile strength at up to about 600° F, plus excellent creep resistance at these temperatures for up to 10 hours, according to Dow.

In long-term properties, including creep strength up to 1000 hours, EK31XA sand castings are serviceable to about 450° F, Dow said.

EK31XA alloy has good castability, can be welded by argon-arc or heli-arc methods, and can be finished with standard magnesium finishing systems. It also is a good forging alloy.

Composition of the alloy is 3.2% rare-earth metal (didymium), 0.6% zirconium, balance magnesium.

Aluminum Camping Trailer Is Convertible

An all-aluminum camping trailer being marketed by Vesely Mfg. Co., Lapeer, Mich., has a specially attached tent that opens up into a 77 square foot living room providing sleeping and camping facilities for a family.

Called the Apache, it was designed with engineering assistance from Kaiser Aluminum & Chemical Sales, Inc. using a Kaiser aluminum alloy. The lightweight trailer, weighing only 340 pounds, can be easily pulled by any automobile traveling at normal speeds and can be rolled by hand to a desirable location not accessible by automobile.

The unpainted, semi-bright finished aluminum surface reflects heat and helps preserve food items stored in the trailer and is free from corrosion and maintenance.

In four minutes, the heavy, 12.65-ounce water repellent canvas tent can be easily set up for the night. The top of the trailer contains a built-in mattress forming a comfortable double bed. Compartment doors pull down to form separate tables.

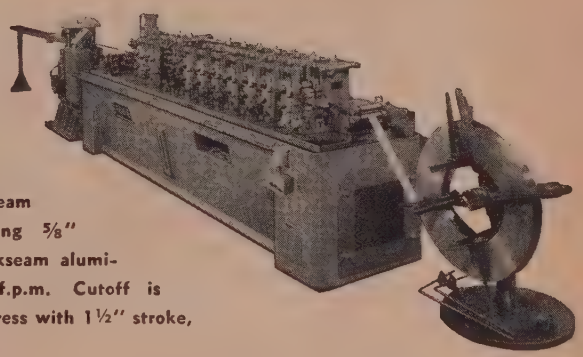
On the road, the trailer is seven feet long by four feet wide and 42-inches high. A removable rack is available to carry a boat or other sports equipment.

Die Casting Lubricant Resists High Heat

A new high temperature resistant lubricant for use on die casting machine plungers has been brought out by the Die Casting "ID" Corp., 4902 Ledge Ave., North Hollywood, Calif.

A dark bronze colored fluid, the "ID" Plunger Lube contains electric furnace graphite and holds other extremely fine metallic combinations for evenly distributed lubrication. Compounded in three consistencies—light, medium and

AMERICAN ROLLER DIE CORP
ARDCOR HIGH PRODUCTION ROLL FORMING MACHINE FOR ALUMINUM SHAPES



This Model SF Lock Seam Tube Mill is forming 5/8" O.D., .016" wall lockseam aluminum tube at 120 f.p.m. Cutoff is ARDCOR Model 10 Press with 1½" stroke, 60 strokes per min.

The new small Model SF ARDCOR Machine features: High production speeds; spindles 1.5"; new style rugged base with tool compartment and slanted front recessed for better operator stance; special narrow side roll stands with close 10" horizontal centers; fixed spur gears; quiet running all V-belt drive; low voltage protection. Basic machine readily converted to a Cold Roll Forming Machine.

ARDCOR Roll Forming Machines and Lock Seam Tube Mills are available in seven standard sizes; other sizes to customer specifications.

If your products can be cold roll formed, ARDCOR engineers can supply advancements in design and machine construction to produce them better . . . at greater speeds and profit.

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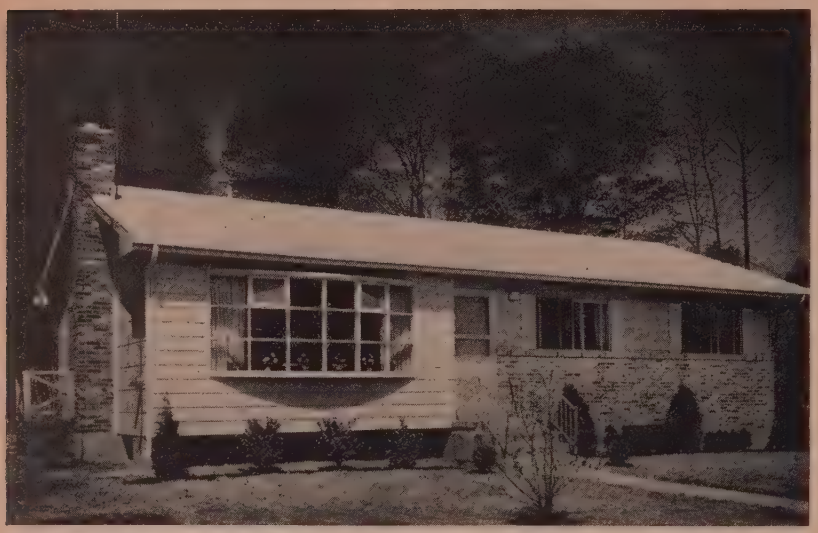
heavy—the material flows at room temperature, hence does not require high pressure for automatic lubrication.

It will not thin out when applied to hot plunger tips, according to the company, nor will it allow by-passing of fluid into the casting runners with its resulting gas porosity.



Kaiser Revamps Building Products Marketing Plans

A comprehensive marketing and development program for aluminum building materials is being launched by Kaiser Aluminum & Chemical Sales Corp., Oakland 12, Calif.

"Our approach is based on practical assistance to the builder and to the manufacturer and distributor of building products in the evaluation of current needs, in product design and development help, and in market promotion, said Edgar F. Kaiser, vice president and director of Kaiser Aluminum.

The first large-scale builder home to be constructed as a direct result of the company's program is the Woodlark (pictured), built by W. Evans Buchanan, secretary of the NAHB. The home incorporates 21 aluminum residential products weighing more than 1700 pounds, including 700 pounds in a newly developed roof.

The model, a prototype for a planned development of more than 100 homes, was inspected by over 600 builders who attended the spring Board of Directors meeting of the National Association of Home Builders.

The 21 aluminum building products in the home include three new specially designed products—Bermuda roofing panels, vented end gables, and soffits. The end gables and soffits are already on the market, while the Bermuda roofing is in an advanced stage of development, Kaiser reports.

Other aluminum products in the Woodlark include electrical conduit, exterior doors, flashing, gutters and downspouts, hardware, heating and air conditioning ducts, kitchen range hood, nails and fasteners, railings, screens, shower enclosure, shutters, siding, sliding glass door, thresholds, windows, light fixtures and combination storm doors.

Kaiser's residential program is centered on three progressive stages: Determining builder needs; obtaining initial builder acceptance of aluminum products tailored to fit the needs; and expanding public demand.

During the first step, Kaiser representatives and product engineers contacted builders and manufacturers of residential products in every major residential construction area in the country to determine builder problems and review aluminum products now available.

During the second step, major builders in large residential areas were encouraged to adopt those aluminum products which solve definite construction problems at equal or less cost. The Woodlark model home was one result.

The third step will be the introduction, during National Home Week in September, of additional builder models in several major housing centers in the U. S. More aluminum products which have been under development will be introduced through early September.

D. A. Rhoades, president of Kaiser Aluminum, said that the program "represents an intensification of the efforts that Kaiser Aluminum & Chemical Corp. has carried out for many years in providing engineering assistance to customer fabricators who manufacture residential building products from aluminum, in stimulating their broad scale distribution and availability and in helping promote the sale of such products."

Plant in Venezuela Planned by Reynolds

Reynolds International, the overseas sales and operating arm of Reynolds Metals Co., is preparing to build an aluminum extrusion plant in Venezuela.

Total investment in the facilities of Reynolds Aluminum de Venezuela, C.A., will be about 20 million bolivars ($6 million) of which 10 million bolivars will be represented by capital stock.

According to J. Louis Reynolds, chairman and chief executive officer of Reynolds International, Venezuelan capital will be invited to participate through sale of stock in the open market.

The new plant will be built near Valencia, according to Reynolds. Plans call for subsequent construction of an aluminum sheet and foil plant and foil converting facilities.

New Gun Adds Scope To MIG Welding in Britain

Experimental work with fine-wire MIG welding in Britain will doubtless open up new fields for the technique there.

Consumable electrode (MIG) welding has special advantages in the welding of aluminum over 3/16-in. thick. High speeds and deep penetration are obtained, and the spray transfer of metal across the arc permits welding in all positions.

However, the smallest diameter filler wire that can easily be fed is 3/64-in. and since the thickness of material that can be welded depends partly upon the thickness of the wire being used, material thinner than 3/16-in. is generally welded by the argon-arc process.

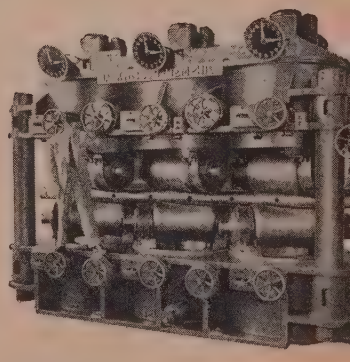
Northern Aluminium Co. Ltd., in conjunction with Aluminium Laboratories Ltd., have developed a new system of MIG welding using self-feeding guns that carry a small spool of wire, instead of a larger spool being located

...ALL SIZES STRAIGHTENED AND PERFECTLY ROUNDED ON MACK-HEMP ROTARY TUBE STRAIGHTENERS

Tubes of any alloy in any O.D. from .050-inch to 16 inches are production straightened and rounded at speeds up to 800 feet per minute or better. The six driven rolls are fully adjustable to suit tube diameter, amount of straightening bend needed, and correct contact grip on the tube. The machine operates without speed-limiting, surface-marring guides and the finished tubing shows no spiral markings.

All models—from the smallest to the largest—are now available in Mack-Hemp's exclusive new three-post construction.

For complete details of Mack-Hemp straighteners, write today for a free copy of our 24-page Technical Bulletin No. 55-A, "How to Straighten Pipe and Tube".



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901 Bingham Street, Pittsburgh 3, Pa.

Makers of the rolls with the Striped Red Wabblers

some distance away. Instead of being pushed through distances of perhaps 10 feet, the wire is pushed about 3 inches, and consequently a much thinner wire can be used.

This fine-wire system has been used in America for about four years and one American gun, together with its electrical equipment, is now being marketed in Britain by Rowen-Arc, Division of Rubery Owen and Co. Ltd. The "Rowen-Gun" can feed wires down to 0.020-in. diameter and so will extend the useful range of MIG welding to materials as thin as 0.036-in.

The gun also has the considerable advantages of portability (it weighs only 4 lbs. including the spool of wire) and easy handling, which makes welding easier in positions to which access is difficult for conventional consumable electrode equipment.

Alcoa, Giant British Firm Set Up Fabricating Concern

A giant stride in Alcoa's bid for a larger role in world aluminum markets was revealed late last month with the announcement that Aluminum Co. of America and Britain's Imperial Chemical Industries, Ltd. had joined forces to establish a new aluminum fabricating concern.

To be named Imperial Aluminium Co., Ltd., the new firm will be owned 51% by ICI and 49% by Alcoa. Its purpose, according to Alcoa, will be "to accelerate the already rapid growth of aluminum manufacture and applications, particularly in the United Kingdom and British Commonwealth markets."

Imperial Aluminium is expected to go into action August 1, at which time it will take over operation of ICI's recently modernized aluminum rolling mill and extrusion plant at Waunarlywdd, near Swansea, South Wales. ICI's Metals Division built and operated the plants for the British government during World War II. The giant British firm later purchased the plants.

"The new partnership demonstrates the belief by both companies that aluminum marketing prospects offer a tremendous potential for such a combination of technical, manufacturing and sales resources," commented Alcoa president Frank Magee.

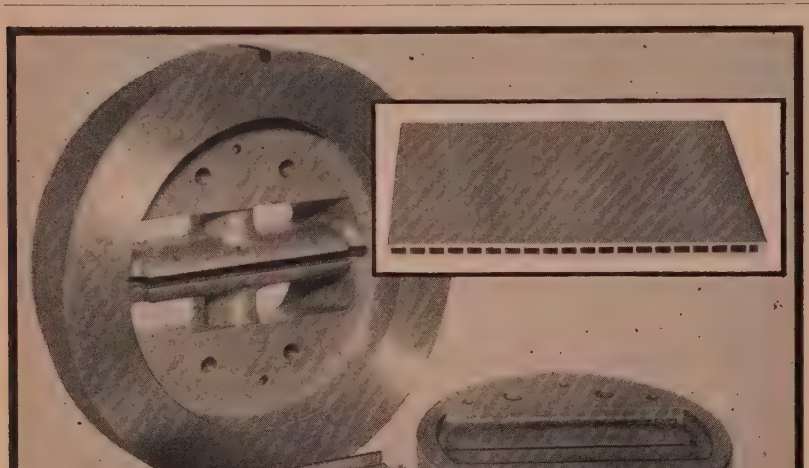
"It brings together Alcoa's 70 years of research and developmental experience in the highly specialized fields of aluminum production and fabrication, and ICI's invaluable background and facilities for manufacturing and marketing in the general area of nonferrous metals," Magee added.

In contrast to recent overseas moves by other U.S. aluminum producers, the Alcoa-ICI arrangement is strictly a partnership — the same route Alcoa adopted recently with Montecatini of Italy and Furukawa Electric of Japan (see "Alcoa 1960," MM, June '59). This way, the company gains most of the advantages of foreign operations without the enormous expense of "going it alone."

Significantly, it has chosen to join forces with very well heeled foreign firms. ICI, for example, has assets exceeding $1.5 billion, grosses some $1 billion annually, and operates 100 plants. Its aluminum facilities reportedly have a total capacity of 25,000 tons of rolled and extruded products annually — a ready-made market for Alcoa metal. Alcoa also reaps the advantages of a strong and active global sales organization.

ICI, on the other hand, gains Alcoa's aluminum know-how. As an ICI official commented, "In our aluminum business we must be right up with the best techniques in the world. Alcoa has those techniques."

Terms of the partnership are subject to the approval of the British Treasury. No difficulty in obtaining this approval is expected, however. Control of Imperial Aluminium will remain in British hands, since ICI's 50% interest would be represented by three of five directors including the chairman and managing director.



extrusion dies by mardis!

Shown above: Original MARDIS-designed, liquid passage, 20-mandrel dies used to extrude the 10¼" extrusion (see inset) from a 9" billet! All MARDIS dies are expertly machined to exceptionally close tolerances. Let MARDIS solve **your** next extrusion problem.

mardis tool & die co., inc.

P. O. Box 134 — Mechanicsburg, Penna. Phone: POplar 6-7637

Extruded Grating Boasts Quick-Snap Joint Method

A lightweight, high-strength extruded aluminum grating made by Read Standard Division of Capitol Products Corp. York, Pa., features an exclusive snap-lock method of field assembly which eliminates need for welding.

Suitable for all types of pedestrian walkways, including such installations as platforms, scaffolding, balconies, and catwalks, the Readco Extrud-Lock grating is made in 1-, 1¼- and 1½-inch thicknesses, in 6-inch wide extrusions and in any specified length.

The snap-lock method of fastening adjacent extruded sections consists of an aluminum clip which is easily hammered into place. Any width of panel can be assembled in the field. The clip ties together the interlocking I-beams of the mating edge of each section, and remains under tension to insure tightness and dimensional stability.

Read Standard points out that the Extrud-Lock grating is particularly suitable for any application where lightweight combined with corrosion resis-

ıce, low maintenance, non-sparking, ıd non-slip qualities are desired. A ıree-foot walk-way will support 350 ounds per square foot. The grating eets or exceeds strength specifications Navy Spec. MIL-G-18015 (Ships) 20 fay 1954, according to Read Standard.

Men-on-the-move

Donald A. Rhoades has been elected resident and chief executive officer of .aiser Aluminum & Chemical Corp. He as served as vice president and general ıanager since early 1946 when Kaiser :arted up in the aluminum business, ut began his association with the wide- diversified Kaiser complex 32 years go.

In other personnel moves, Kaiser appointed **Charles D. Smith** manager of ıe Ravenswood, W. Va. rolling mill. **loyd A. Amos,** who previously served ı this capacity, has been transferred to .aiser's headquarters in Oakland Calif., here he will have increased responsiilities in a new executive assignment. mith had been works manager at Trentwood, Wash. **Robert F. Buechner** as been named new works manager at Trentwood.

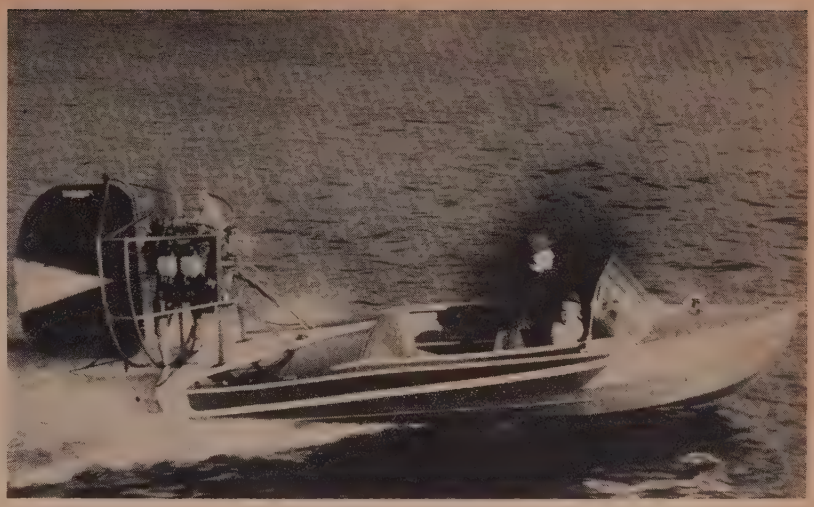
Precision Extrusions, Inc., Bensenille, Ill., has appointed **Kenneth P. eeger** chief metallurgist. He had been ıetallurgist at Alcoa's Lafayette, Ind., ılant.

Nichols Wire & Aluminum Co., Davenport, Iowa, has promoted three vetran executives. **Girard J. Brenneman,** ormerly assistant sales manager, was ıamed marketing manager. **James D. Case** becomes manager of sales, mill division and **C. L. Johnston** is the new general manager, warehouse division. All three started as sales representatives.

Carroll J. Brown has been named executive vice president of Cupples Door & Frame Corp., Dowagiac, Mich., manufacturer of extruded aluminum doors and entrances.

Amchem Products, Inc., has named **George Russell** chief engineer. Russell, who had been assistant to chief engineer Jay Biery, got his promotion when Biery retired after 31 years with the company. Amchem manufactures chemicals for the metalworking industry and for agriculture.

Ralph W. Bailey has been named assistant general sales manager of the Federated Metals Division of American Smelting and Refining Co., New York. He'll retain his present position as sales manager of Asarco's Continuous Cast Products Department. A metallurgist, Bailey had served in this capacity with Scovill Mfg. Co., Waterbury, Conn., and United Aircraft Products Co.



Versatile, Lightweight Aluminum Airboat

The aluminum airboat pictured operates on wet mud, grass, or water of any depth at speeds upto 35 mph. Airboats, Inc., 3323 N. Florissant Ave., St. Louis 7, Mo., is making two models, called the Airboy Deluxe and Special. Hulls are heavy gauge aluminum alloy treated for salt water use.

Five stringers or keels are attached to the bottom of the boat to further strengthen and protect it in running on ice or over mud flats and gravel bars. The aluminum rudder can operate completely in the air, independent of the water.

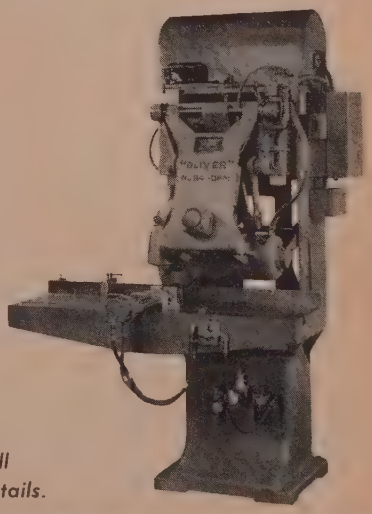
The 14-ft. long, 62-in. wide, four to six passenger aluminum air boats are powered by a four cylinder, 65 hp aircraft engine equipped with electric starter and generator. The boats can be easily transported on a normal boat trailer.

Included with the deluxe model is a long, sloping all aluminum read deck, wrap-around windshield, running lights, and upholstered seats.

"OLIVER" No. 94-DHM HYDRAULIC CUT-OFF SAW

Cuts nonferrous metals without burr and at a high rate of production

For aluminum extrusions, billets, copper and brass bars, tubing, etc. Designed for precision performance. Saw: 14" std. for 3" cuts; 20" max. for 6" cuts. Stroke: 28 per minute maximum for 6" wide material. Table is cast iron 15" x 48" with aluminum throat plate and opening with chute for automatic removal of pieces up to 6" long.



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OLIVER MACHINERY COMPANY
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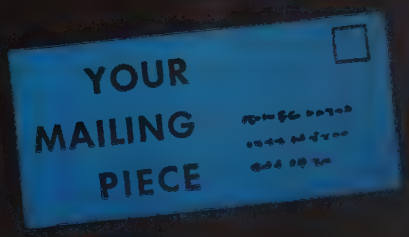

For doubly effective selling to the Light Metals Industry

REACH MORE THAN 25,000 LIGHT METAL PROCESSORS AND PRODUCT MANUFACTURERS

with this double barreled sales service

The light metals industry — over 25,000 firms that process and use aluminum, magnesium and titanium — is the growing-est and buying-est segment of the metalworking business. This year these firms are using more light metals in a richer array of new and improved products than ever before. They are also creating a huge demand for all the materials, equipment and services that metalworkers require.

Only Modern Metals covers this entire market. You can reap a two-fold benefit from this exclusive coverage by advertising in Modern Metals and taking advantage of Modern Metals' direct mail service. Mailings are made to the only detailed up-to-date mailing list devoted exclusively to the booming light metals market; can be aimed at the entire industry or only those firms in your marketing area.

TYPICAL RESULTS of direct mail campaigns by Modern Metals advertisers:

Case A — A manufacturer of aluminum soldering flux received over 3,500 inquiries from a mailing of 16,000 to Modern Metals' list. He commented: "Extremely satisfying, if not remarkable."

Case B — A recent mailing by a maker of colored aluminum coil brought a 9% return. Their comment: "A very effective mailing list . . . Replies are still coming in."

Case C — From a mailing of 10,000 letters, an aluminum foundry received 1,700 replies. Comment: "Total inquiries will exceed 20%, and some good business has already resulted."

Case D — An aluminum anodizing plant recently made a mailing of 6,500 pieces, and received 130 returns within two weeks. His comment: "We have already added seven new accounts, three of which are big volume customers."

●

For sheer market saturation you can't find a more potent sales tool than Modern Metals' advertising-direct mail service. We've got all the details ready for you. Simply write today to . . .

MODERN METALS

1814 Tribune Tower **Chicago 11, Ill.**

Where to buy... MATERIALS EQUIPMENT SERVICES for the Light Metals Indus

THIS BUYERS GUIDE IS PUBLISHED FOR THE CONVENIENCE OF FABRICATORS AND PRODUCT MANUFACTURERS WHO ARE SEEKING SUPPLIERS OF MATERIALS, EQUIPMENT AND SERVICES. THE FIRMS LISTED ARE ADVERTISERS IN MODERN METALS, AND CONSTITUTE MAJOR SUPPLY SOURCES.

MATERIALS

ARCHITECTURAL SHAPES

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Jarl Extrusions, Inc.
Linden Avenue
East Rochester, New York

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Avenue
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Wolverine Tube,
Div. of Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

BAR AND ROD

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada (Mg)

The Dow Chemical Company
Magnesium Department
Midland, Michigan (Mg)

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio (Al)

Harvey Aluminum
Torrance, Calif. (Al)

Jarl Extrusions, Inc.
Linden Avenue
East Rochester, New York

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa (Al)

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas (Al)

R. D. Werner Co., Inc.
Dept. 41
Greenville, Pa.

Wolverine Tube
Div. of Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

BILLET, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Wolverine Tube
Div. of Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

BILLET, MAGNESIUM

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Company
Magnesium Department
Midland, Michigan

BILLET, TITANIUM

Harvey Aluminum
Torrance, Calif.

BRAZING SALTS, ALUMINUM

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

BUS CONDUCTOR, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

CASTINGS, ALUMINUM DIE

Allen-Stevens Corp.
33-53 62nd St.
Woodside, N. Y.

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Federal Die Casting Company
2226 North Elston
Chicago, Illinois

Hampden Brass & Aluminum Co.
262 Liberty St.
Springfield, Mass.

Madison-Kipp Corp.
217 Waubesa Street
Madison 4, Wisconsin

CASTINGS, MAGNESIUM DIE

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

The Dow Chemical Company
Magnesium Department
Midland, Michigan

CASTINGS, ALUMINUM, SAND AND PERMANENT MOLD

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Light Alloys Ltd.
320 Bay St.
Toronto, Ont.

A. C. Williams Co.
Ravenna, Ohio

CASTINGS, MAGNESIUM, SAND AND PERMANENT MOLD

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Company
Magnesium Department
Midland, Michigan

Light Alloys Ltd.
320 Bay St.
Toronto, Ont.

A. C. Williams Co.
Ravenna, Ohio

CIRCLES, ALUMINUM

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Co.
Fairmont, W. Va.

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

CLEANERS, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, New Jersey

MacDermid Inc.
Waterbury 20, Conn.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector Street
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

COATINGS, ELECTRICALLY CONDUCTIVE

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Graphite Products Corp.
Brookfield, Ohio

COIL, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Company
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Johnston Foil Div.
Standard Packaging Corp.
6008 S. Broadway
St. Louis 11, Mo.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

Sheet Aluminum Corp.
701 Liberty St.
Jackson, Mich.

COILS, PRE-ANODIZED

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

COILS, PRE-PAINTED

Bridgeport Brass Co.
Aluminum Division
Bridgeport 2, Conn.

Coated Materials Div.
P. O. Box 9536
Pittsburgh 23, Pa.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

(COILS, PREPAINTED, continued)

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

COMPOUNDS, BARREL FINISHING

MacDermid Inc.
Waterbury 20, Conn.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

CONVERSION COATING FOR ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

CURTAIN WALLS, ALUMINUM

Panelfab Products, Inc.
2001 N.E. 146th St.
North Miami, Fla.

DETERGENTS

MacDermid Inc.
Waterbury 20, Conn.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Turco Products Incorporated
6135 South Central Avenue
Los Angeles 1, California

DIE STEELS FOR DIE CASTING

Latrobe Steel Co.
Latrobe, Pa.

DIE STEEL, EXTRUSION

Latrobe Steel Co.
Latrobe, Pa.

DISPERSIONS, COLLOIDAL-GRAPHITE

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Grafo Colloids Co.
259 Wilkes Pl.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

DISTRIBUTORS & JOBBERS (Al)

These firms handle aluminum sheet, plate, coils, rolled shapes, rod, bar, tubing, wire, etc.

Adam Metal Supply, Inc.
4-63 48th Ave.
Long Island City, I, N. Y.

Aluminum Distributors, Inc.
7301 W. Harrison Street
Forest Park, Illinois

Aluminum Mill Supply Corp.
42-44 Court Street
Brooklyn 1, N. Y.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Atlantic Aluminum & Metal Distributors, Inc.
Page Boulevard
Springfield, Massachusetts

Edgecomb Steel Corp.
460 Hillside Ave.
Hillside, N. J.

Peter A. Frasse and Company
17 Grand Street
New York, N. Y.

General Materials Co.
1400 Plaza Ave.
New Hyde Pk., N. Y.

J & L Steel Warehouse Div.
545 W. McCarty
Indianapolis 5, Ind.

E. M. Jorgensen Company
10650 South Alameda
Los Angeles, California

Perry Kilsby, Inc.
2501 S. Malt Ave.
Los Angeles 22, Calif.

Korhumel Steel & Aluminum Co.
2424 Oakton St.
Evanston, Ill.

Precision Steel Warehouse, Inc.
3500 North Wolf Road
Franklin Park, Illinois

Production Metals, Inc.
299 Pavonia Ave.
Jersey City 2, N. J.

Reynolds Aluminum Supply Co.
573 W. Peachtree Street, N.E.
Atlanta, Georgia

Joseph T. Ryerson & Son, Inc.
16th and Rockwell Streets
Chicago 80, Illinois

Vosler Aluminum Corp.
40-08 Cpl Kennedy St.
Bayside 61, N. Y.

Whitehead Metals, Inc.
303 W. 10th St.
New York 14, N. Y.

DOORS, ALUMINUM, ANODIZED

Panelfab Products, Inc.
2001 N.E. 146th St.
North Miami, Fla.

DRAWING COMPOUNDS, METAL AND WIRE

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Graphite Products Corp.
Brookfield, Ohio

ELECTRODES FOR WELDING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

Kaiser Aluminum & Chemical Corp.
919 No. Michigan Ave.
Chicago 11, Ill.

Metal and Thermit Corp.
Rahway, New Jersey

ENAMELS, PORCELAIN ALUMINUM

Ferro Corporation
4150 E. 56th St.
Cleveland 5, Ohio

ETCHANT, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pa.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

MacDermid Inc.
Waterbury 20, Conn.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

EXTRUSIONS, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Benson Aluminum Co., Inc.
621 Virginia St.
Connersville, Ind.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Jarl Extrusions, Inc.
Linden Avenue
East Rochester, New York

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

National Impacted Metal Corp.
P. O. Box 151
New Albany, Miss.

Olin Aluminum
400 Park Avenue
New York 22, New York

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Revere Copper & Brass, Inc.
230 Park Avenue
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Wells Aluminum Corp.
North Liberty, Ind.

R. D. Werner Co., Inc.
Dept. 41
Greenville, Pa.

Wolverine Tube
Div. of Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

EXTRUSIONS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif

Magnesium Co. of America
East Chicago, Indiana (Mg)

National Impacted Metal Corp.
P. O. Box 151
New Albany, Miss.

EXTRUSIONS, IMPACT, MAGNESIUM

National Impacted Metal Corp.
P. O. Box 151
New Albany, Miss.

EXTRUSIONS, IMPACT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Company
Magnesium Department
Midland, Michigan

EXTRUSIONS, TITANIUM

Bridgeport Brass Company
Aluminum Division
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, ZINC, IMPACT

National Impacted Metal Corp.
P. O. Box 151
New Albany, Miss.

EXTRUSIONS, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

FASTENERS, ALUMINUM

Southern Screw Company
Statesville, North Carolina

FENCING, ALUMINUM

Nichols Wire & Aluminum Co.
Davenport, Iowa

FILLER METAL, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

FILLER METAL, MAGNESIUM

All-State Welding Alloys
249-55 Ferris Ave.
White Plains, N. Y.

FINISHES AND COATINGS, ALUMINUM

Amchem Products, Inc.
Ambler 12, Pennsylvania

The Chemical Corporation
54 Waltham Avenue
Springfield 9, Mass.

Conversion Chemical Corp.
101 E. Main St.
Rockville, Conn.

Diversey Corp.
1820 Roscoe St.
Chicago 13, Ill.

Eastman Chemical Products, Inc.
Kingsport, Tennessee

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

MacDermid Inc.
Waterbury 20, Conn.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

FLUXES, ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Smelting & Refining C
Maple Heights, Ohio

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div.
American Smelting & Refining Corp.
120 Broadway
New York 5, N. Y.

Kaiser Aluminum & Chemical Sal
Kaiser Center
Oakland 12, Calif.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

FLUX, ALUMINUM SOLDERING

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

FLUX, BRAZING

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

FLUX, WELDING

All-State Welding Alloys Co. Inc.
249-55 Ferris Ave.
White Plains, N. Y.

FLUXES, MAGNESIUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Avenue
White Plains, New York

The Dow Chemical Co.
Magnesium Dept.
Midland, Mich.

FOIL, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Johnston Foil Div.
Standard Packaging Corp.
6008 S. Broadway
St. Louis 11, Mo.

Kaiser Aluminum & Chemical Sa
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Avenue
New York 17, N. Y.

Reynolds Metals Company
6601 West Broad St.
Richmond 18, Va.

FORGINGS, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn. (Al, Ti)

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sa
Kaiser Center
Oakland 12, Calif.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Wyman-Gordon Company
Worcester 1, Mass. (Al, Mg,

FORGINGS, COLD, NO-DRAFT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

FORGINGS, EXTRUSION, TOOL

Latrobe Steel Co.
Latrobe, Pa.

FORGINGS, IMPACT

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

FORGINGS, MAGNESIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
Aluminum Division
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Wyman-Gordon Company
Worcester 1, Mass. (Al, Mg, Ti)

FORGINGS, TITANIUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Wyman Gordon Company
Worcester 1. Mass.

FRIT FOR ALUMINUM

Ferro Corp.
4150 E. 56th St.
Cleveland 5, Ohio

HARDWARE, DOOR, WINDOW

Allen-Stevens Corp.
33-53 62nd St.
Woodside, N. Y.

Lake Park Metal Stamping, Inc.
1122 Velma Court
Youngstown, Ohio

HEAT TREATING SALTS, ALUMINUM

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

HINGES, ALUMINUM, ALL TYPES

Lake Park Metal Stamping Inc.
1122 Velma Court
Youngstown, Ohio

INGOT, ALUMINUM (ALLOYS)

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Federated Metals Div. ASARCO
120 Broadway
New York 5, N. Y.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

INGOT, MAGNESIUM (ALLOYS)

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Co.
Magnesium Department
Midland, Michigan

INGOT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

INSERTS, SCREW THREAD

Heli-Coil Corporation
805 Shelter Rock Lane
Danbury, Connecticut

IRRIGATION PIPE, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

LUBRICANTS, CASTING

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

Scott Chemical Corp.
510 W. Garfield
Glendale, Calif.

LUBRICANTS, EXTRUDING

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Graphite Products Corp.
Brookfield, Ohio

LUBRICANTS, FORGING

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Graphite Products Corp.
Brookfield, Ohio

LUBRICANTS, METALWORKING

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Scott Chemical Corp.
510 W. Garfield
Glendale, Calif.

MAINTENANCE MATERIALS, PAINT SPRAY BOOTH

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

NAILS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

NUTS

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

PANELS, ALUMINUM

Panelfab Products, Inc.
2001 N.E. 146th St.
North Miami, Fla.

PARTING COMPOUNDS

American Charcoal Co.
201 S. Green St.
Detroit 17, Mich.

Graphite Products Corp.
Brookfield, Ohio

PIG, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Transatlantic, Inc.
30 Rockefeller Plaza
New York 20, N. Y.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

PIPE, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Perry Kilsby Inc.
2501 S. Malt Ave.
Los Angeles 22, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Wolverine Tube
Div. of Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

PLASTIC CAPS, INSERTS FOR TUBULAR FURNITURE

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

PLASTIC GLIDES, RUNNERS FOR WINDOWS, DOORS, SCREENS

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

PLATE, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Fairmont Aluminum Company
Fairmont, West Virginia

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Rockingham Road
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Sheet Aluminum Corp.
701 Liberty St.
Jackson, Mich.

PLATE, MAGNESIUM

The Dow Chemical Company
Magnesium Department
Midland, Michigan

PLATE, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

POLISHING, CHEMICAL

Alchemize Corporation
1431 South Talman Avenue
Chicago 8, Illinois

MacDermid Inc.
Waterbury 20, Conn.

REFRACTORIES

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

General Refractories Co.
1520 Locust St.
Philadelphia 2, Pa.

H. K. Porter Co., Inc.
Porter Bldg.
Pittsburgh 19, Pa.

Refractory Products Co.
910 Custer Ave.
Evanston, Ill.

REFRACTORY CONES for FURNACE TAP-OUT PLUGS

Refractory Products Co.
910 Custer Ave.
Evanston, Ill.

RIVETS, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

ROD AND BAR, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

ROD, BRAZING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

ROD, WELDING

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Buildings
Pittsburgh 19, Pennsylvania

American Solder & Flux Co.
19th and Willard Sts.
Philadelphia 40, Pa.

The Dow Chemical Co.
Magnesium Dept.
Midland, Mich.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

SCREEN WIRE, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

SCREWS, MACHINE, ALUMINUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Southern Screw Company
Statesville, North Carolina

SCREWS, TAPPING, ALUMINUM

Southern Screw Company
Statesville, North Carolina

SCREWS, WOOD, ALUMINUM

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

Southern Screw Company
Statesville, North Carolina

SHAPES, ROLL FORMED

Allmetal Weatherstrip Co.
1911 Ridge Ave.
Evanston, Ill.

Nichols Wire & Aluminum Company
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Roll Formed Products Co.
3754 Oakwood Avenue
Youngstown, Ohio

R. D. Werner Co., Inc.
Dept. 41
Greenville, Pa.

SHEET, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Foils, Inc.
Jackson, Tenn.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Company
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Johnston Foil Div.
Standard Packaging Corp.
6008 S. Broadway
St. Louis 11, Mo.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Conn.

Sheet Aluminum Corp.
701 Liberty St.
Jackson, Mich.

SHEET, ANODIZED

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

City Plating & Polishing Co.
22nd & Cole Street
St. Louis 6, Missouri

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

SHEET, MAGNESIUM

The Dow Chemical Company
Magnesium Department
Midland, Mich.

SHEET, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

SOLDER, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pa.

SPOOLED ALUMINUM

All-State Welding Alloys Co., Inc.
249-55 Ferris Ave.
White Plains, N. Y.

STORM DOOR CLOSURES

Lake Park Metal Stamping Inc.
1122 Velma Court
Youngstown, Ohio

STORM DOOR LATCHES

Lake Park Metal Stamping Inc.
1122 Velma Court
Youngstown, Ohio

STRUCTURALS, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Company of America
877 Alcoa Building
Pittsburgh 19, Pennsylvania

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

THORIUM METAL

Davison Chemical Co., Div.
of W. R. Grace & Co.
Erwin, Tenn.

Dominion Magnesium, Ltd.
Suite 1505, 320 Bay St.
Toronto, Canada

TITANIUM, POWDER

United International Research, Inc.
Long Island City 1, N. Y.

TOOLING PLATE, MAGNESIUM

The Dow Chemical Co.
Magnesium Dept.
Midland, Mich.

TREAD PLATE, MAGNESIUM

The Dow Chemical Co.
Magnesium Dept.
Midland, Mich.

TUBED SHEET, ALUMINUM

Olin Aluminum Division
400 Park Ave.
New York 22, N. Y.

Revere Copper & Brass Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Co.
6601 W. Broad St.
Richmond 18, Va.

TUBING, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Hygrade Metal Moulding Mfg. Co.
778 Glenmore Ave.
Brooklyn 8, N. Y.

Jarl Extrusions, Inc.
Linden Avenue
East Rochester, New York

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Perry Kilsby Inc.
2501 S. Malt Ave.
Los Angeles 22, Calif.

Olin Aluminum
400 Park Avenue
New York 22, New York

Precision Extrusions, Inc.
721 East Green Street
Bensenville, Illinois

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pennsylvania

Revere Copper & Brass, Inc.
230 Park Ave.
New York 17, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions Company
North Washington Street
Magnolia, Arkansas

R. D. Werner Co., Inc.
Dept. 41
Greenville, Pa.

Wolverine Tube
Div. Calumet & Hecla, Inc.
17200 Southfield Rd.
Allen Park, Mich.

TUBING, MAGNESIUM

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Dominion Magnesium, Ltd.
320 Bay Street
Toronto, Ont., Canada

The Dow Chemical Company
Magnesium Department
Midland, Michigan

TUBING, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

Wolverine Tube
Div. Calumet & Hecla Inc.
17200 Southfield Rd.
Allen Park, Mich.

VENETIAN BLIND STOCK

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

WIRE, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Avenue
White Plains, New York

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
877 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Conn.

WIRE, PRECISION SPOOLED, ALUMINUM

All-State Welding Alloys Co.
249-55 Ferris Ave.
White Plains, N. Y.

WIRE DRAWING COMPOUNDS

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

EQUIPMENT

ANODIZING EQUIPMENT

Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

The Meaker Co.
1629 S. 55th Ave.
Chicago 50, Ill.

The Gilbert Tramer Co.
1217 Main
Cleveland, Ohio

BARREL FINISHING EQUIPMENT

Hanson-Van Winkle-Munning Co.
Matawan, N. J.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

BEARINGS

Morgan Construction Co.
Worcester, Mass.

BELT GRINDERS, ABRASIVE

Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

BILLET CUTTERS

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Manufacturing Co.
114 East 32nd Street
New York 16, New York

Ty-Sa-Man Machine Co.
Box 1269
Knoxville 1, Tenn.

BILLET HEATERS

Ajax-Magnethermic Corp.
3990 Simon Road
Youngstown 7, Ohio

Granco, Inc.
317 32nd St., S.W.
Grand Rapids 8, Mich.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

BUFFING & POLISHING EQUIPMENT

Young Bros. Co.
1828 Columbus Rd.
Cleveland 13, Ohio

The Gilbert Tramer Co.
1217 Main Ave.
Cleveland 13, Ohio

Hammond Machinery Builders
1600 Douglas Ave.
Kalamazoo, Michigan

Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

BUFFS AND WHEELS

Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

CANISTERS, GRAPHITE

Becker Brothers Carbon Co.
3450 S. Laramie Ave.
Cicero 50, Ill.

CASTING EQUIPMENT, BILLET

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

CASTING MACHINES CONTINUOUS

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, New York

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

COATING THICKNESS TESTER

Unit Process Assemblies, Inc.
61 E. 4th St.
New York 3, N. Y.

COLD DRAW EQUIPMENT

The Aetna-Standard Engineering Co
Frick Building
Pittsburgh 30, Pa.

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

COLD DRAWING MACHINE, CONTINUOUS

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

CONTOUR CORRECTING MACHINES

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

CRUCIBLES, MELTING, MAGNESIU

Steel-Alloy Products Co.
18-55 42nd St.
Long Island City 5, N. Y.

Swedish Crucible Steel Co.
8801 Conant Ave.
Detroit 11, Mich.

CUTTING MACHINES

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Mettler Machine Tool Inc.
155 Adeline St.
New Haven, Conn.

Ty-Sa-Man Machine Co.
Box 1269
Knoxville 1, Tenn.

CUTTING MACHINES, WIRE

Mettler Machine Tool Inc.
155 Adeline St.
New Haven, Conn.

CUT-OFF MACHINES

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Michigan Roll Form, Inc.
8909 Hubbell
Detroit 28, Mich.

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

Ty-Sa-Man Machine Co.
Box 1269
Knoxville 1, Tenn.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

DETWISTING MACHINES

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

DIE CASTING MACHINES

B & T Machinery Co.
Div. Greenlee Bros. & Co.
217 W. Eighth St.
Holland, Mich.

Cast-Master
Div. of Koehring Co.,
Hydraulic Press Mfg. Div.
23901 Aurora Road
Bedford, Ohio

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

DIE HEATERS

The Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio

The Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio

DIES, DIE CASTING

Alpha Industries, Inc.
615 Center Ave.
Logansport, Ind.

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

DIES, EXTRUSION

Extrusion Die & Tool Co.
22126 Ryan Road
Warren, Mich.

Lake Park Tool & Die Co.
1122 Velma Court
Youngstown, Ohio

Mardis Tool & Die Co.
P. O. B. 134
Mechanicsburg, Pa.

Moczik Tool & Die Works
9511 Grinnell Avenue
Detroit 13, Michigan

PMD Extrusion Die Co.
5747 Beebe Ave.
Warren, Mich.

Supreme Extrusion Die & Tool
106 E. Ten Mile Road
Hazel Park, Mich.

DIES, NOTCHING

Michigan Roll Form, Inc.
8909 Hubbell
Detroit 28, Mich.

DIES, ROLL FORMING

American Roller Die Corp.
29501 Clayton Avenue
Wickliffe, Ohio

Brunken & Goodwin Tool Engineering
7 North Second St.
Maywood, Ill.

Michigan Roll Form
8909 Hubbell
Detroit 28, Mich.

The Yoder Company
5539 Walworth Ave.
Cleveland 2, Ohio

DOCK BOARDS, MAGNESIUM

Magnesium Company of America
East Chicago 13, Indiana

DRAWBENCHES

The Aetna-Standard Engineering Co.
Frick Building
Pittsburgh 30, Pa.

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

DRILLS (MULTIPLE) for EXTRUSIONS

Clark Automation Equipment Co.
419 W. Main St.
Belding, Mich.

DUST COLLECTION UNITS

Hammond Machinery Builders, Inc.
1609 Douglas Avenue
Kalamazoo, Michigan

ELECTROPLATING EQUIPMENT

Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

The Gilbert Tramer Co.
1217 Main Ave.
Cleveland 13, Ohio

EXTRUSION BOARDS, GRAPHITE

Becker Brothers Carbon Co.
3450 South Laramie Avenue
Cicero 50, Illinois

EXTRUSION COILERS

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

EXTRUSION COOLING DEVICES

Clark Automation Equipment Co.
419 W. Main St.
Belding, Mich.

EXTRUSION HANDLING SYSTEMS

Clark Automation Equipment Co.
419 W. Main St.
Belding, Mich.

EXTRUSION PRESSES

(See PRESSES)

EXTRUSION PRESS TOOLS

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

FILMS, X-RAY

Eastman Kodak Company
X-Ray Division
343 State Street
Rochester 4, New York

Picker X-Ray Corporation
25 S. Broadway
White Plains, New York

FOIL MILLS

Blaw-Knox Co.
Blawnox, Pa.

E. W. Bliss Company
Salem, Ohio

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

United Engineering & Foundry Co.
Pittsburgh 22, Pennsylvania

FORMING MACHINES

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

The Yoder Co.
5539 Walworth Ave.
Cleveland 2, Ohio

FORMING ROLLS

American Roller Die Corp.
29510 Clayton Avenue
Wickliffe, Ohio

The Lockformer Co.
4617 W. Roosevelt Rd.
Chicago 50, Ill.

The Yoder Company
5539 Walworth Avenue
Cleveland 2, Ohio

FURNACE CONTROL EQUIPMENT

Morgan Construction Co.
Worcester, Mass.

FURNACES, HEAT TREATING

Holcroft & Co.
6545 Epworth Blvd.
Detroit 10, Mich.

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Illinois

Magnethermic Corporation
3990 Simon Road
Youngstown 7, Ohio

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

W. S. Rockwell Co., Inc.
2068 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

FURNACES, HEATING

The Lanly Company
755 Prospect Avenue
Cleveland, Ohio

Magnethermic Corporation
3990 Simon Road
Youngstown 7, Ohio

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

W. S. Rockwell Co., Inc.
2068 Eliot Street
Fairfield, Conn.

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

FURNACES, MELTING

Ajax Engineering Corp.
P. O. Box 1418
Trenton 7, N. J.

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

Swindell-Dressler Corp.
P. O. Box 1888
Pittsburgh, Pa.

GENERATORS, GAS ATMOSPHERE

Lindberg Engineering Co.
2446 W. Hubbard St.
Chicago 12, Ill.

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

GRINDERS, BELT

Hammond Machinery Builders, Inc.
1609 Douglas Avenue
Kalamazoo, Michigan

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

GRINDERS, DISC

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

GRINDER — POLISHER

American Laubscher Corp.
250 W. 57th St.
New York 19, N. Y.

Hammond Machinery Builders, Inc.
1609 Douglas Avenue
Kalamazoo, Michigan

Madison-Kipp Corp.
217 Wabesa Street
Madison 4, Wisconsin

LATHES, BUFFING & POLISHING

Hammond Machinery Builders, Inc.
1609 Douglas Avenue
Kalamazoo, Michigan

LEVELERS, ROLLER SHEET

E. W. Bliss Company
Salem, Ohio

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Stanat Mfg. Co.
500 Shames Drive
Westbury, N. Y.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

F. A. Woehr Machine Co.
17 Favor St.
Rochester, N. Y.

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

LEVELERS—ROLLER & STRETCHER

The Aetna-Standard Engineering Co.
Frick Building
Pittsburgh 30, Pa.

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

E. W. Bliss Company
Salem, Ohio

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Stanat Mfg. Co.
500 Shames Drive
Westbury, N. Y.

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

United Engineering & Foundry Co.
Pittsburgh 22, Pennsylvania

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

MELTING POTS, CAST IRON

American Car & Foundry Div.
ACF Industries, Inc.
30 Church Street
New York 8, New York

MILLING MACHINES

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Loma Machine Mfg. Co., Inc.
114 E. 32nd St.
New York 16, N. Y.

Oliver Machinery Company
445 Sixth Street, N.W.
Grand Rapids 2, Michigan

MOLDS, INGOT

American Car & Foundry Div.
ACF Industries, Inc.
30 Church Street
New York 8, New York

Beckmann Engineering Co.
115-20 Myrtle Ave.
Richmond Hill 18, N. Y.

Lobeck Casting Processes Inc.
114 E. 32nd St.
New York 16, N. Y.

OVENS, AGING

The Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio

The Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio

(OVENS, AGEING, continued)

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

OVENS, HEAT TREATING

Ajax-Magnethermic Corporation
3990 Simon Road
Youngstown 7, Ohio

The Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio

Lindberg Engineering Co.
2446 Hubbard St.
Chicago 12, Ill.

The Carl Mayer Corporation
20800 Center Ridge Rd.
Cleveland 16, Ohio

Sunbeam Equipment Corp.
180 Mercer St.
Meadville, Pa.

Young Bros. Co.
1828 Columbus Rd.
Cleveland 13, Ohio

PISTON CORES

Permanent Mold Die Co., Inc.
2275 E. Nine Mile Road
Hazel Park, Mich.

PLATING EQUIPMENT

Hanson-Van Winkle-Munning Co.
Matawan, New Jersey

The Meaker Co.
1629 S. 55th Ave.
Chicago 50, Ill.

PRESSES, DRAWING, FORMING, STAMPING, ETC.

E. W. Bliss Co.
1375 Raff Road, S.W.
Canton, Ohio

Feller Engineering Company
1159 Empire Building
Pittsburgh 22, Pennsylvania

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

PRESSES, EXTRUSION

E. W. Bliss Co.
1375 Raff Road, S.W.
Canton, Ohio

Feller Engineering Company
1159 Empire Building
Pittsburgh 22, Pennsylvania

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
111 Fifth Avenue
New York 3, New York

Sutton Engineering Company
First National Bank Building
Pittsburgh 22, Pennsylvania

Watson-Stillman Press Div.
Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

Youngstown Foundry & Machine Co.
Reserve Street
Youngstown 2, Ohio

PRESSES, FORGING

E. W. Bliss Co.
1375 Raff Road, S.W.
Canton, Ohio

Feller Engineering Company
1159 Empire Building
Pittsburgh 22, Pennsylvania

Loewy-Hydropress
Div. Baldwin-Lima-Hamilton
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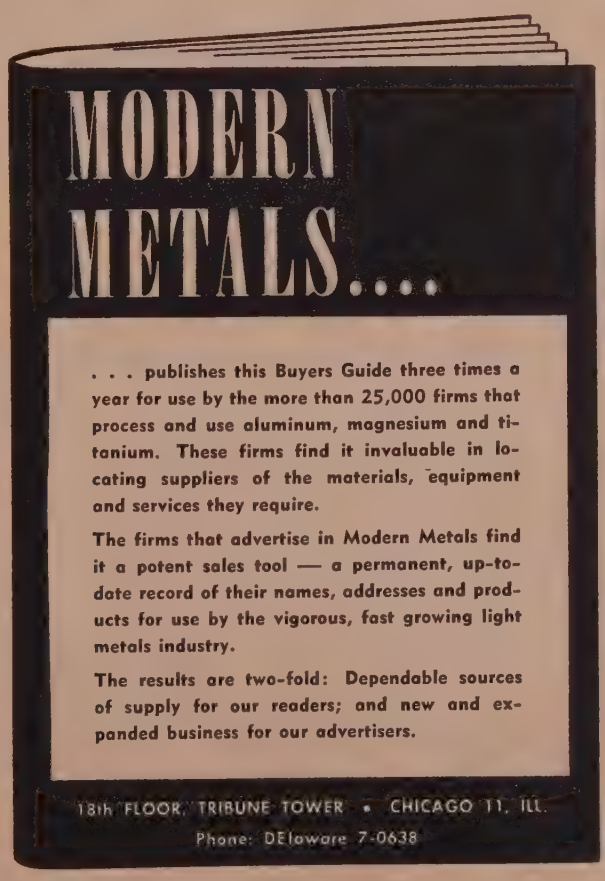
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Looking Ahead

Those crazy aluminum stocks are at it again. Just a year ago we published an analysis — "What's Wrong With the Aluminum Company Stocks?" — that showed the common stocks of the major producers suffering steep declines since the end of 1956. As a group, they had slipped 35.7%. Aluminium Limited was off 32%; Alcoa, 29%; Kaiser Aluminum, 45%; and Reynolds Metals, 37%. Some brokers seemed all but ready to bury the aluminums. But times have changed! Comparing prices as of July 10 with typical prices about a year ago, we find that the aluminums as a group have racked up a rousing 104% gain. Aluminium Limited is up 32%; Alcoa, 64%; Kaiser Aluminum, 136%; and Reynolds Metals, 184%. They have ranked among the most active stocks on the New York Exchange in the past couple of months, usually out-pacing today's big bull market. The reasons? There are several, but we suspect that investors are impressed with aluminum's great growth potential. Here are some straws in the wind:

Second quarter aluminum sales of all producers far exceeded most optimistic hopes. Reynolds Metals, operating its primary production plants at 100% of capacity, announced that first half sales are 30% over the comparable period in 1958. Reynolds will probably earn around $14 million in the second quarter. Kaiser Aluminum, a slow starter during the first quarter, has run out of primary metal for July. The company shipped more in the last two months than ever before in its history. Its business is up about 34%. On sales of about $130 million, Kaiser will make close to $10 million in the second quarter, compared with $4.5 million in the first quarter. Alcoa, which netted $8 million in the second quarter of '58 and $10.7 million in the first quarter of '59, is expected to clear at least $18 million in the second quarter. July will be the biggest month for all three producers this year; perhaps the biggest month ever recorded.

Aluminium Limited's second quarter earnings did not measure up to the $5,120,000 netted by the big Canadian producer in the second period of 1958. Demand was on the rise, however, and June brought the best sales record "in many months." Aluminium Limited's third quarter should be a good one because the company has no labor contracts to cope with. If U. S. aluminum producers are idled by a strike, demand for Canadian aluminum will skyrocket. As for prices, Aluminium's president, Nathanael Davis, stated last month that: "The continuing excess of pig and ingot supply can hardly be expected to exert any upward pressure on pig and ingot prices at this time. On the other hand . . . current fabricated prices on many items provide small incentive to the fabricator. There is stronger support at present for an upward movement of prices at the fabricating level than at the primary level."

As for August, all of the American producers see a substantial drop-off in orders. Shipments may drop as much as 25%, even without a strike. All predict a sharp upturn in September, however, followed by a good fourth quarter. As for 1960, the producers are very bullish; seem to think next year will show production and sales at all-time highs.

By the time you read this, the steel strike will be on. Our guess is that it will last a month; will end with a token wage increase and marginal benefits. In the meantime, aluminum producers, not anxious to shut down their potlines, may settle along the same lines as steel. But if they go out, aluminum will get scarce fast because there is none in the pipelines. Deadline for the strike is July 31st.

Strike or no strike, the price of aluminum is bound to go up. Producers feel that present prices are too low; that the 2c reduction in April '58 should be recovered. Since they upped prices 0.7c after the cut, it seems reasonably certain that the increase will amount to 1.3c. We feel that .7c is adequate, but the 1.3c figure seems closer to what they really want.

Lots of talk that prices of sheet, extrusions, etc., will go up substantially — some say as much as 20%. This is ridiculous, what with the growing list of commodity prices and price-cutting still very much in evidence, due to hard-to-get customers. The major aluminum elements could get quite a price increase on semi-fabricated products if they reverted to the published price schedules which have existed all along.

Magnesium industry's prospects look brighter, despite a drop in wrought product shipments in May. Production of primary metal was boosted to 2668 tons in May, a 48% increase over the April rate. Indications are that output in the first half approximated 13,000 tons. Though this is about 5000 tons below 1958's first half total, actual shipments of primary ingot probably topped 22,000 tons. Thus, demand is far out-running production, as the industry continues to feed on its huge inventory of primary magnesium. Shipments of wrought products hit 1050 tons in April — the highest monthly rate since May 1957. Thus, the drop to 822 tons in May probably reflects a return to a stabilized demand rate. The Magnesium Association notes that "June figures are expected to move upward."

— The Editors

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From canoes to cargo ships to luxury liners, ship designers and builders are using light, strong aluminum in more and more ways. Indeed—today's modern superliners use as much as 4,000,000 pounds of aluminum per ship, and plans for future liners call for even more! It is estimated that by 1965, the transportation industry alone will need 650,000 tons of aluminum yearly!

Fortunately—in nearby Canada, Aluminium Limited has harnessed water power to create the vast amounts of electricity needed to make high-quality aluminum ingot. As in the past, this source of ingot will help meet the United States' expanding needs . . . needs that will probably double by 1965.

Aluminium Limited sells no consumer products in the U. S. It specializes instead in supplying high-quality aluminum ingot as well as technical assistance to help its customers expand their markets.

Aluminium Limited

*Ingot Specialist...*serving American Aluminum Fabricators—

In the U.S.—Aluminium Limited Sales, Inc., 630 Fifth Avenue, N.Y. 20, N.Y.
CLEVELAND • CHICAGO • LOS ANGELES • DETROIT • ATLANTA • ST. LOUIS

Additional distribution (Alcan Foundry Alloys):
Apex Smelting Company, Chicago, Cleveland, Los Angeles
Charles Batchelder Co., Inc., Botsford, Conn.

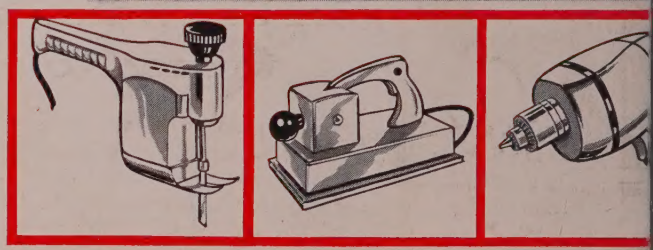
FOR A BETTER JOB IN LESS TIME...

he's using power tools made with aluminum

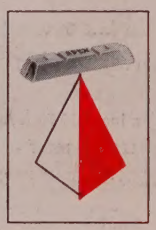
Today's homeowner is handier than ever and the professional works faster, delivers a better job—thanks to power tools and the versatility of aluminum. Whether you're sawing, sanding or drilling, these specialized tools provide the modern, easy way to finish the task.

Lightweight aluminum helps make power tools more portable, easier to handle. They give better service and last longer because aluminum is stronger. It's the one metal that resists rust, corrosion, pitting and chipping, always stays new looking. Too, manufacturers prefer aluminum because it can be formed in many ways, is easy to machine, and saves costly production steps.

Apex Smelting Company and its metallurgists work closely with the foundries and die casters who serve the power tool industry. Custom and standard aluminum alloys, scientifically produced by Apex to rigid specifications, are providing the performance and quality you want in these modern day work-savers.



Research leadership back of every ingot



APEX SMELTING COMPANY

Producers of ALUMINUM, MAGNESIUM AND ZINC ALLOYS

CHICAGO 12 CLEVELAND 5 LONG BEACH 10, CAL.
SPRINGFIELD, OREGON (National Metallurgical Corp.)

Your products may also be produced better and more efficiently with the help of aluminum castings. Apex Smelting and the companies it serves in the die casting and foundry industry stand ready to assist you and your engineers.